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MODEL **Airplane** NEWS

WORLD CLASS SCALE!

TOP GUN 2001 page 32



WE REVIEW

- T-craft—.20 clipped-wing sport plane
- Hawk—high-performance park flyer
- Yak-18—.40 ARF warbird
- Ultimate—1.20 aerobatic biplane



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MODELS Airplane NEWS

AUGUST 2001 • VOLUME 129, NUMBER 8

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ON THE COVER: main image—the winner of Top Gun's Designer Scale, Jeff Foley, built this impressive Bf-109 fighter. Insets (top to bottom)—1/3-scale Zlin 526 built by Javier Mangudo and flown in Team Scale by Steffen Zoun; Paul Donofrio's Sikorsky S-39B, flown by Anthony Greco in Team Scale; Lee Rice's Ki-61 Tony comes in for a landing; the Team Scale-winning P-51 Mustang built by Bill Stevik and piloted by Dean DiGiorgio; the O.S. .914-stroke engine (see "Air Power," page 98).

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New "Backyard Flyer" Column

This month, we're excited to introduce a column devoted exclusively to the hottest new trend in RC: backyard flyers. Whether you fly these small electric models in a nearby field, a parking lot, or your own backyard, you're guaranteed to have a great time. *Model Airplane News* senior editor Chris Chianelli has been bitten by the small, electric RC bug, and he's looking forward to sharing his experiences and information on the latest backyard models and gear. Check out his inaugural column on page 116; then stay tuned for all the latest developments in backyard RC.

TOP GUN 2001

For the last 13 years, Frank Tiano has invited the best scale modelers in the world to compete at Top Gun, sponsored by *Model Airplane News* and Pacer Technology, manufacturer of Zap adhesives. The extraordinary scale craftsmanship and detail



Chris wrings out the Megatech Merlin for his first "Backyard Flyer" column; see page 116.

ers and warbirds and—for the first time—helicopters. Although they were scored only in static competition this year, the crowd's enthusiastic reaction to the scale choppers has ensured their return next year for scale and flight competition.

NICK ZIROLI'S WINDEX

When he isn't building and flying giant-scale Top Gun models, Nick Zirol Sr. dabbles in small backyard flyers and other electric designs. His latest creation is the Windex 1200C—a sport-scale glider that can be powered by a Speed 400 motor or a Norvel 1/2A engine. If you're looking for a straightforward building project that will stand out at the flying field, consider building Nick's 72-inch-span design. ✦



One of the first helicopters invited to compete at Top Gun, this model McDonnell Douglas AH-64 Apache is the handiwork of Mike Robbins.

MODEL Airplane NEWS

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AIRWAVES

Our readers write back

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Airwaves," *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA; man@airage.com. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous number of letters we receive, we cannot respond to every one.

GETTING INTO SCALE

I have been flying model airplanes for a couple of years, and I enjoy sport flying very much. I am now flying a Hobbico AirVista with an O.S. .40 for power. I really enjoy reading about scale airplanes and would like to try building and flying a scale fighter. I went to a local event last year, and there were many WW II fighters there; I was hooked! The problem is, I don't really know how to go about making the switch from sport airplanes to a complicated, built-up wooden model such as a Top Flite Gold Edition Corsair or Mustang. I even hope one day to design my own warplane and build it from scratch, so any help you can give me will be greatly appreciated.

RANDY PERRY
Orlando, FL

Randy, just as your familiarity with sport RC modeling occurred gradually, so should your transition to scale—especially to warbirds.

Anyone with little building experience who simply jumped from a sport ARF model to an advanced, wooden building project would quickly be overwhelmed. Perhaps a few modelers could do it, but for most beginners, it is



best to proceed slowly into new areas of the hobby. The first thing to do is to buy, build and then fly a wooden sport model so you gain bench experience. It will also be helpful if you can find a local modeler with building experience who can help you start off on the right foot. After you've built and flown your model, find a more advanced design and do the same thing. Eventually, you should be comfortable

with a high-performance sport model that has many of the same characteristics and components as the warbird you want eventually to build. Once you have built a low-wing, .60- or .90-size, retract-equipped sport model and can fly it comfortably, you'll be ready for a warbird of similar size. Several ARF warbirds are on the market now, and you can gain valuable flying experience with them before you dig more deeply into scale modeling. From there, you can tackle fiberglass and paint finishing and even add details such as rivets and panel lines. Just take it one step at a time, and enjoy the hobby as you gain experience. Good luck! GY

FORMULA TO CALCULATE CG

A number of kind readers have pointed out that an incorrect formula slipped into my article on a simple calculator method for finding where RC models should be balanced for their first flight. The error was due to my carelessness, not the magazine's, and I apologize to any readers who

1st Time Pilots or Seasoned Pros...



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were inconvenienced. The correct formulas—and the surprising tale of how the error snuck by undetected—can be found at www.jefraskin.com. When you get there, click on "How to Balance a Model Airplane" in the site directory.

For a quick fix, use this formula for "P" instead of the one given in the article:

$$P = (R + 2 \times T) / (3 \times (R + T))$$

JEFF RASKIN

REYNOLDS PLASTIC WRAP

A big thank you to Dave Robelen for his great article on covering small models with light plastic film (July 2001 issue of *Model Airplane News*). I read it just as I was finishing building my Great Planes Fundango, and I decided to cover it in yellow Reynolds Plastic Wrap. It was easy to use, and it looks great—and best of all, it was already on the kitchen shelf! I'm really enjoying building and flying these little electric airplanes; please keep these types of how-to articles coming.

DEREK CLEGHORN
 Fairfield, CT

Derek, we're glad you found this technique useful. We're also excited about the possibilities of small RC airplanes, and we look forward to more articles from Dave and our other micro RC enthusiasts.
DS

ANTENNA ANSWERS

I enjoyed Don Edberg's article, "Antenna ABCs," in the June 2001 issue. This subject doesn't seem to get much attention. It was quite informative, as is everything you publish. One area that the article didn't touch on concerns concealing the receiver antenna completely within the aircraft—something I have been wondering about for a while. I am presently scratch-building a 1/4-scale Caudron C-460. As I fabricated the fuselage bulkheads, I drilled small holes in their upper sections so I could lace the antenna wire through them just underneath the top sheeting. As long as the rest of the radio equipment is kept away from it, would this affect the range of the receiver? Thanks for any light you can shed on the subject.

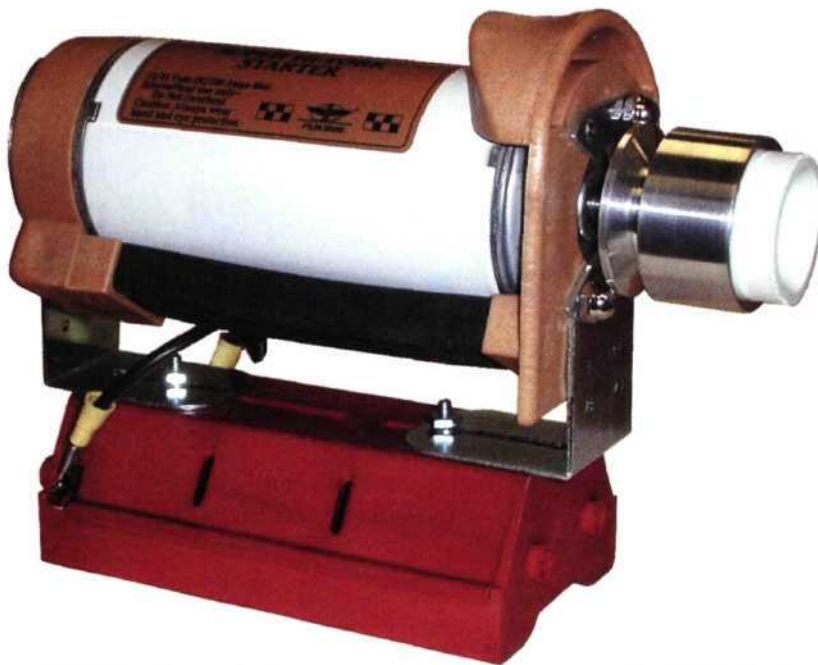
T.J. SUERDIECK
 Tipp City, OH

T.J., we agree; Don's article contained a good bit of information about a topic we all seem to take for granted. Installing the receiver antenna within a fuselage is a very sound and

common way of concealing it, especially in scale models. A convenient way to install the antenna is to first string a length of tubing through the bulkheads and then feed the antenna wire through it. This makes it easier to install and remove the antenna if you have to do so later on. As long as you do not cover the model with thin metal sheet or route the

antenna near other metal or electrical items, you shouldn't have any problems. Also, be aware that some plastic film coverings have aluminum pigment in their adhesive backing (to make them more opaque), and this can cause a reduction in radio range. Good luck with your Caudron C-460.
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your model's tank. It also comes with a clunk and an extra fuel tube for a third line pick-up. With Du-Bro's new Glo Caddy, you can store your glow-plug igniter on a bracket on your field box or clip it to your belt or pocket. It accommodates sub-C and most C-size glow-plug igniters. Each product costs only \$4.95. What a bargain!

Du-Bro, P.O. Box 815, Wauconda, IL 60084; (800) 848-9411; fax (847) 526-1604; rc@dubro.com; www.dubro.com.

WATTAGE

F-22 Pusher Electric Jet

Want a quick, easy-to-build and fly model to jet around with? With its full-flying stabilators, this 25.5-inch-span, 20-ounce foam model should be very maneuverable and, powered by a supplied 370 motor, gearbox and prop, it will provide excellent flight performance on an 8-cell 600mAh battery pack. This model requires only a 3-channel radio with elevon mixing, two microservos, a micro receiver and an ESC. You can even make your F-22 look like the full-size Raptor with the included scale detail set—all for less than \$90 street price.

The new MRX-4 micro receiver from Cirrus is a perfect match to the Raptor



and any other park flyer. Weighing in at only 11 grams (with crystal and full-length antenna), this 4-channel receiver has a 1,000-foot range and comes in two versions to handle any type of FM/PPM transmitter.

WattAge and Cirrus; distributed by Global Hobby Distributors, 18480 Bandilier Cir., Fountain Valley, CA 92728-8610; (714) 964-0827; fax (714) 962-6452; www.globalhobby.com.



HORIZON

Bigger Firebird & Vigor 3D Heli



The popular Hobby Zone Firebird, a great-flying ready-to-fly model that comes with a 2-channel transmitter, 7.2V NiMH pack and charger, is now available in a bigger version, and it has landing gear! The 40-inch-span Firebird XL is powered by a Mabuchi 380 motor, has bigger tail surfaces for even better control and a wing shim that can be inserted under the trailing edge in the center of the wing to reduce its angle of incidence. With the included instructional video, even first-time RCers can assemble the Firebird XL in minutes and complete a successful first flight. This model isn't only for newcomers, though; we can't wait to get a review model to fly in the field outside the office!



Another update to Horizon's product line, the Vigor CS incorporates JR's new constant-drive, split-gear, shaft-drive tail rotor, carbon-fiber main frames, tank mount and fin set along with 140-degree collective cyclic pitch mixing (CCPM) push/pull control system. From its low parts count and lightweight, seamless fiberglass body to its CNC-machined, clear-anodized aluminum bellcranks, the Vigor features the latest in 3D aerobatics engineering.

Horizon Hobby Inc., 4105 Fieldstone Rd., Champaign, IL 61822; (800) 338-4639; fax (217) 355-1552; www.horizonhobby.com.



GREAT PLANES

Laser Models Kits

Nothing compares to building a model airplane out of wood. These kits have laser-cut, high-quality balsa parts that securely interlock so that you can build them quickly and easily; also, they include easy-to-follow, illustrated instructions, full-size plans and hardware, including wheels, landing gear, fuel tank, pushrods, clevises, control horns. The lineup features a 55-inch-span, .15 to .20-size Colibri trainer (comes in 3- and 4-channel versions); a 67-inch-span, .40-size Ibis aerobatic trainer; a 58-inch-span, fun-fly



Laser 3D
.40 aerobatic; a
39.4-inch-span,
.25- to .61-size Laser
Arrow Delta Wing with a
wide range of performance; and last, but not least, a
31.5-inch-span, Mini Laser 3D EP park flyer that
comes with a Speed 300 motor. These kits retail
for from \$109 to \$179.

Laser Models; distributed by Great Planes
Model Distributors Co., P.O. Box 9021,
Champaign, IL 61826-9021; (800) 682-8948;
fax (217) 398-008; www.bestrc.com/lasermodels.

HERR ENGINEERING

Park Flyers



Herr Engineering just introduced a quartet of great-looking balsa park-flyer kits. Each model is designed for direct-drive Speed 280 power and a 3-channel radio and can be covered with traditional iron-on covering materials. They feature all laser-cut wooden parts, computer-drawn plans, full hardware, landing-gear legs and wheels (except Rally-XP). The Piper J-3 Cub has a 35.25-inch wingspan; the Air Boss: 35.75 inches; the Mini-Sport: 32 inches; and the Rally-XP: a full 50 inches.

Herr Engineering Corp., 1431 Chaffee Dr., Ste. #3, Titusville, FL 32780; (321) 264-2488; www.iflyherr.com.



DAVE PLATT MODELS

Black Art Video Series, "The Jet Set"

World-renowned for his involvement in scale aircraft modeling, Dave Platt, in his Black Art videotapes, has given us his secrets, tips and techniques for building museum-quality RC airplanes. The Jet Set is a new series that shows the construction of Dave's turbine-powered Hawker Hunter.

This five-tape series filmed in Dave's workshop shows the viewer each step in the model's construction, from basic techniques and equipment layout to installation and operation of the turbine power system. Cockpit detail, retracts, control surfaces, fiberglassing and painting are all explained as only Dave "Mr. Scale" Platt can do.

Dave Platt Models, 1306 Havre NW, Palm Bay, FL 32907; (407) 724-2144.

FOUR PI INC.

Ready-to-cover Skyraider

Four Pi's newest addition to its prebuilt model line is this PB Skyraider. "PB" stands for prebuilt, which means you only have to supply hardware, radio gear and an engine (.75 to 1.2 2-stroke or .90 to 1.6 4-stroke). The all-wood Skyraider comes with prebent main gear, a fiberglass cowl and linkage for ailerons and flaps. It has an 80-inch wingspan, which equates to about 1/6 scale, weighs 10 to 13 pounds dry and requires a 4- to 6-channel radio. It costs \$495, including shipping and handling.

Four Pi Inc., 4944 N. Orange Ave., Norridge, IL 60706; phone/fax (708) 457-2177; www.fourpi.com; sysbauer@charlie.cns.iit.edu.



AIRCRAFT INTL.

Piper PA-18 Super Cub

It was very hard to miss the 33-percent-scale, 155-inch-span Super Cub from 3W at the 2001 Toledo RC Model Expo. This gigantic ARC was in the Aircraft Intl. booth and features a gelcoated fiberglass cowl and plug-in wing panels. To assist in transporting the model, the tail group is removable. The ARC also comes with ready-made wing struts and landing gear. The PA-18 is 99 inches long and has a flying weight of 35 to 40 pounds; 85 percent of its parts are laser cut. Naturally, the power recommendation for this beautiful scale cabin aircraft is either the 3W100 or 3W120 twin-cylinder gasoline engine.

Aircraft Intl. Inc., 8 Country Meadow Dr., Colts Neck, NJ 07722; (732) 761-0997; www.aircraft-intl.com.

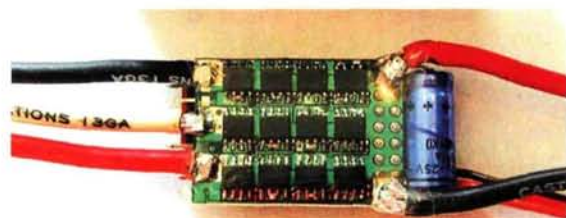


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Avance & Freestyle ARFs

You'll be in the air and wowing the crowd in no time with either of these lightweight, wood and foam pattern ships. The Avance features iron-on covering, custom retracts, a clear, molded canopy, painted fiberglass belly pan, a painted fiberglass cowl and a clear template cowl. All hardware, including pull/pull rudder cables, 11-inch prop, adjustable tailwheel and wingtip skids are included. Specs: wingspan—57 inches; 600-square-inch area; 5.25 to 5.75 pounds; 5-channel radio with five servos required. The Freestyle comes with iron-on covering, aluminum landing gear, fiberglass cowl and wheel pants and a complete hardware package. Specs: wingspan—55 inches; 700 square inch area; 5 to 5.5 pounds; 4-channel radio with five servos required. A Magnum .46 is the perfect powerplant for both models, which are expected to cost less than \$200 each.

Global Hobby Distributors, 18480 Bandilier Cir., Fountain Valley, CA 92728-8610; (714) 964-0827; fax (714) 962-6452; www.globalhobby.com.



CASTLE CREATIONS

Dragon-55 Brushless ESC

The newest product to join Castle Creations' high-quality

lineup, this 55A, reversible electronic speed control for brushless motors has it all: dual BEC circuitry, brake and 4.7V low-voltage motor cutoff. It will operate on 6 to 16 cells (10 cells max with BEC) and weighs only 1.2 ounces with wires—0.45 ounce without! The Dragon-55 is 1.6x0.9x0.4 inches, so it will fit into even the tightest fuselage. At a retail price of only \$159.99, it's a bargain. Airplane and helicopter versions are available.

Castle Creations, 18773 W. 117th St., Olathe, KS 66061; (913) 438-6325; www.castlecreations.com. ★

READERS' TIPS & TRICKS

WITH ILLUSTRATIONS BY DAVID BAKER

SEND IN YOUR IDEAS. *Model Airplane News* will give a free, one-year subscription (or one-year renewal, if you already subscribe) for each idea used in "Readers' Tips & Tricks." Send a rough sketch to *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can't acknowledge each one, nor can we return unused material.



CUSTOM CRADLES

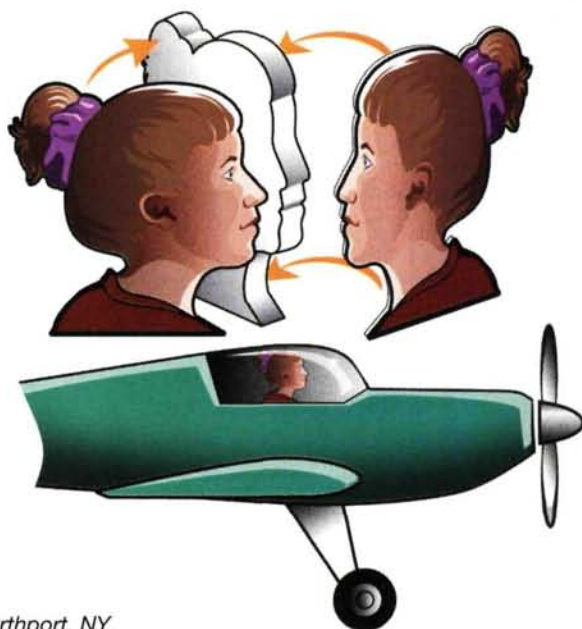
You can make nifty cradles to support your model in the workshop by screwing aluminum landing-gear legs to some scrap lumber. The plywood base is wide enough to prevent the cradle from tipping over. To protect your model's finish, cover the aluminum landing gear with foam.

Theodore Zaborski, West Roxbury, MA

PERSONAL PROFILES

To put a profile pilot figure of his granddaughter, Christine, into one of his planes, this clever fellow took photos of her left and right profiles and glued them to 1/4-inch thick foamboard. Finding that the two pictures didn't quite match, he had a second print made of the first picture by turning the negative over and printing a perfect mirror image. It was then a simple matter to glue the first picture to the foamboard, cut it to shape and then glue the mirror image picture onto the rear. A perfect match every time.

Richard Ellingsen, East Northport, NY



FORMING FIBERGLASS

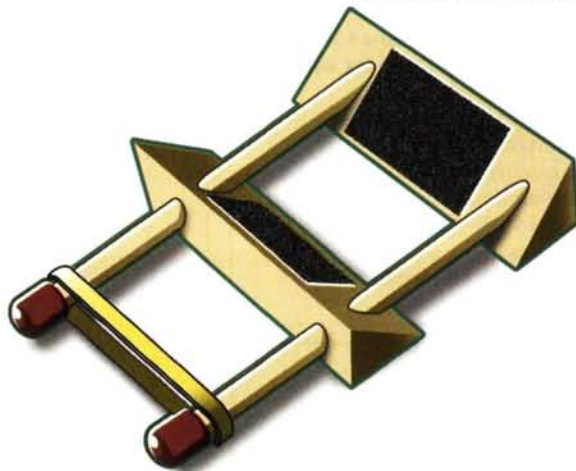
Sometimes, the fiberglass engine cowl that comes with your model may not precisely fit the fuselage. For thin fiberglass cowls, use a heat gun to heat the cowl where it needs a better fit. Mold the cowl into place with your fingers and hold it until it cools. This method also works on plastic cowls and canopies, but be careful: plastic requires less heat.

Don Hoffmann, Torrance, CA

ADJUSTABLE WHEEL CHOCKS

To prevent his model from rolling off the workbench, this modeler made adjustable wheel chocks supported by a pair of dowels. Because they're adjustable, these chocks can be used with small and large wheels. The rubber bands help to hold the chocks in position so the wheels don't slip out.

Glenn Elliott, Houston, TX

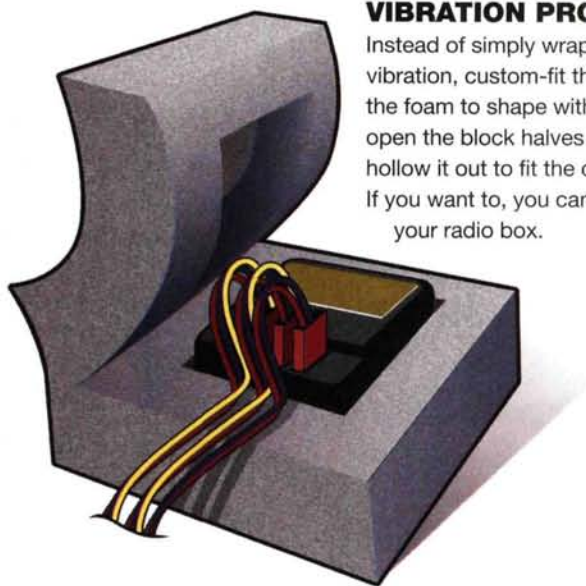


READERS' TIPS & TRICKS

VIBRATION PROTECTION

Instead of simply wrapping foam around your receiver and battery pack to protect them from engine vibration, custom-fit them in a foam block. Use a felt-tip pen to mark their shapes on the foam, then cut the foam to shape with a band saw. Cut into the block only just far enough to form a "hinge" at one side, open the block halves as you would a book, trace the shape of the receiver or battery on the foam and hollow it out to fit the component. Use tape to hold the foam halves securely around your protected item. If you want to, you can make foam-block holders large enough to hold several items and to fit snugly in your radio box.

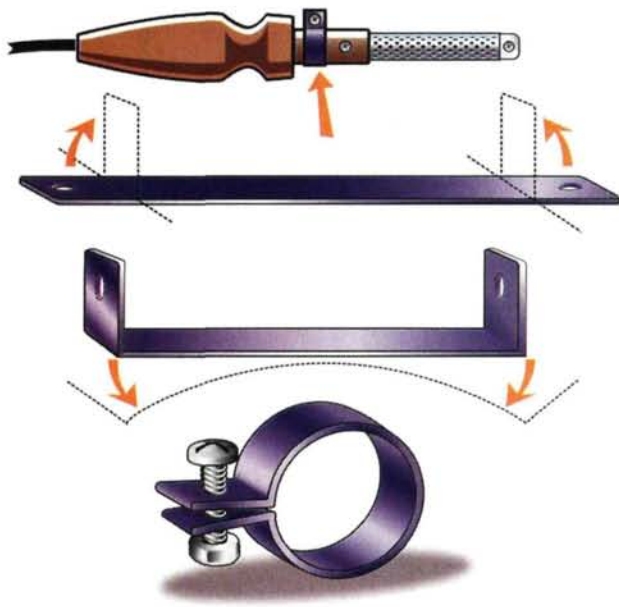
Ward Kelley, Slidell, LA



TRIM IRON REPAIR

The wooden insulation bushing on the Top Flite Trim Sealing iron tends to split lengthwise over time because of temperature changes. When the wood splits, the heating element loosens and is difficult to control. Use a small hose clamp to securely hold the element in place. If you can't find a clamp narrow enough to fit between the plastic handle and the small retaining screw in the wooden bushing, you can easily make your own with a strip of $\frac{3}{16}$ -inch wide, 0.030-thick brass and a 2-56 machine screw and nut.

Gene DeCook, Canandaigua, NY



BATTERY-PACK ASSEMBLY

When assembling a receiver pack or a drive battery pack, "hot-glue" the cells together before you solder them. The glue holds the cells perfectly and makes the pack easier to manage. When you've finished soldering, cover the solder joints with hot glue to insulate them. Go easy with the glue; you need only a few drops.

Ward Kelley, Slidell, LA



PROPS AT A GLANCE

Don't throw out that old BBQ grill—at least, not all of it. Take the grate off the grill, clean it thoroughly with oven cleaner and cut every other rung at opposite ends. This produces two racks. Paint the racks and screw them to a wall or an overhead beam, and your props will be easy to store and find.

Rich McGuinness, Londonderry, NH

PILOT PROJECTS

A look at what our readers are doing



AMAZING AUSSIE

Barry Payne of New South Wales, Australia, built this Ryan STM from a modified Airplane Model Workshop kit. Barry's plane weighs 7 pounds, 5 ounces, has a 65-inch wingspan and is powered by a Magnum .52, 4-stroke engine. It's finished with chrome Solartrim and aluminum



MonoKote. Barry uses a Hitec Flash 5 radio with 4 channels. The Ryan STM, a descendent of the Ryan ST, was used as a primary trainer during WW II.



RADIANT IN RED

It took Richard Van Patten, of Lake Forest, CA, nearly six months to complete this Top Flite Stinson SR-9, but the result was worth it. According to Richard, the beautiful dark red MonoKote covering gets a lot of attention at the flying field. The model has a 100½-inch wingspan, is powered by an O.S. 1.20 4-stroke engine and uses a Futaba radio with eight servos.

ICELAND'S FINEST

This photo of Kristján Fríðthjofsson's Top Flite Cessna 182 Skylane comes to us all the way from Iceland, where Kristján is a member of the Flugmodelfélag Reykjavíkur flying club. Kristján spent three years constructing this 1/5-scale beauty. The plane runs on an O.S. Surpass 1.20 4-stroke engine and is complete with scale flaps, navigation lights, a Midwest instrument panel and a Top Flite scale cabin kit.

A NEW GENERATION

Roger Lufkin of Keizer, OR, reassures us that the art of flying model airplanes is not one that has been forgotten by the younger generation. Roger sent this photo of his 14-year-old grandson holding a Tiger Sport 40.

According to the proud grandpa, the littlest Lufkin began flying just six months ago and soloed after only five flights.



TUSKEGEE TRIBUTE

Al Kanser of New Lisbon, NY, skillfully transformed his Top Flite giant-scale P-51 Mustang into a nearly perfect replica of the Tuskegee Airmen P-51 on display at the Air Mobility Command Museum in Dover, DE. The model is equipped with a Quadra 52 engine, Robart retracts and DGL custom graphics, and it's piloted by a "G.I. Joe" Tuskegee airman in a scale flight suit. Michelle Hollick, pictured with the plane, is wearing one of Al's most prized possessions: a Tuskegee Airmen T-shirt autographed by six of the famous fliers.



◀ MODIFIED FIGHTER

Tony Kameen of Moreno Valley, CA, has enjoyed scratch-building prop-powered jets for many years, so when Great Planes came out with its jet series, he just couldn't resist. Because he preferred a darker paint scheme, Tony decided to convert the F-15 Eagle into an F-15E Strike Eagle. His modifications included building the canopy up 1/2 inch in back to create a twin cockpit, installing retractable landing gear and adding a hatch that covered the full length of the canopy. The bomb and rocket pylons, remnants of an earlier project, are the perfect finishing touches for Tony's fighter.

DESERT STORM ▶

This nicely finished, 1/5-scale Pica P-51 Mustang is the handiwork of Chuck Patterson of Henderson, NV. "Sherri Baby" is powered by a Zenoah G-62 turning a 22x10 prop. Chuck installed Century Jet retracts with scale gear doors and applied an Ultracote and MonoKote Pearl Teal finish. The result, Chuck says, is a beautiful plane that flies like a dream.



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Actual Model Shown

*Price does not include shipping.

PILOT PROJECTS



FLOATING CUB

Roy Moore of Fairfield, CT, built this Piper Cub floatplane using an old Pilot kit, but he designed the floats himself. The plane is powered by a Speed 500 geared motor turning an 11x6 wooden prop. The Cub has a 56-inch wingspan, weighs in at about 56 ounces and uses a standard 7-cell battery. According to Roy, his plane makes perfect, hands-off water takeoffs, and it can stay in the air for approximately 3 1/2 minutes.



SOUTHERN SENSATION

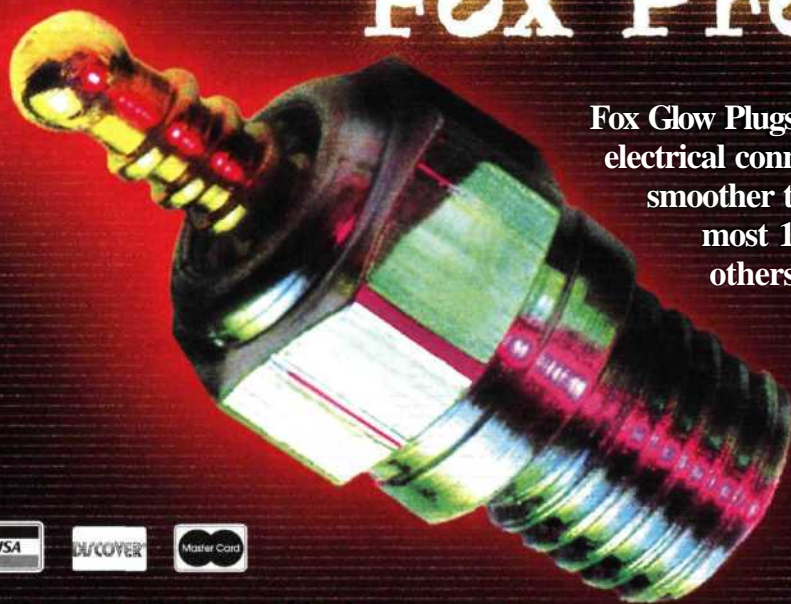
John Anderson of Sharpsburg, GA, built this 1/6-scale MonoCoupe 90A from a plan by Frank Mizens. John, a retired Eastern Airlines pilot, powers his plane with a turbo 10/20 brushless motor with a 3:1 gear reduction. The model has a 65-inch wingspan, weighs 7 pounds and is equipped with Hitec radio gear. Designer Mizens, of North Olmsted, OH, sent us the photo and assures us that the model flies great!

< BRITISH BORN

Bill Welle of Nokomis, FL, scratch-built this 6-foot-span, 3-pound electric "Denny Plane." British actor Reginald Denny designed the original plane in 1937, but plans for an RC version were not published until 1977. Bill's model runs on an 05 motor geared 3:1 driving an 8x11 prop with a 7-cell, 800mAh pack. It's covered with white Dacron fabric that's sealed with white glue. According to Bill, who has been a modeler since the 1930s, the plane's flight is slow and stately.

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The 13th annual Top Gun Scale Invitational, held April 25 to April 29, 2001, was attended by 67 of the best scale modelers from the U.S. and around the world. This year, as always, *Model Airplane News* teamed up with Pacer Technology (the Zap Gang) as the primary sponsors of the famous West Palm Beach, FL, event. As in the past, the Palm Beach Aero Club did a bang-up job of hosting. For many modelers, this annual extravaganza is the pinnacle of scale competition, and I have to agree with that thought. Every year, I'm amazed to see the thousands of spectators who fill the bleachers, and this year was no exception. School kids and their parents, modelers from all over the world and many local residents packed the stands to cheer for their favorite models and competitors. You simply have to see it to really appreciate how well regarded this event is by those who come to witness the show. And it is a show!

The greatest scale show on earth!

by Rick Bell



Terry Nitsch earned the first-place Expert award for an unprecedented sixth time. Flying his twin turbine-powered BVM Rafale B-01, Terry also captured the coveted "Mr. Top Gun" title by besting Jeff Foley (first place in Designer) by only % point. This was both Terry's and Jeff's 12th year of competition at Top Gun.

1st PLACE EXPERT

TOP GUN 1 CHAMPION



1st PLACE DESIGNER



Bill Stevik prepares his beautiful FiberClassics P-51 for another round. Flown by Dean DiGiorgio, the Mustang earned the pair a first-place win in Team.



1st PLACE TEAM



Winning both the Best Civilian and the Engineering Excellence awards, this twin-turbine-powered Airbus A-330 was entered in Team by Peter Michel and was flown by full-size airliner pilot Stephan Durrstein. After making several impressive flights, the huge Airbus fell victim to the infamous Polo Grounds crosswind.

First place in Designer Scale was won by Jeff Foley with his Me 109E. Powered by a Moki 1.8, the Messerschmitt also won the Best 2-Stroke Performance award.

TOP 2001 GUN



Sponsored by ZAP and Model Airplane News

TOP 2001 GUN

Helicopters make the scene at » Top Gurij

for the helicopters, I found David Sweatt hard at work rounding up the contestants.

How did scale helicopters get invited to Top Gun? For one thing, through David's hard work and perseverance. He had joined an Internet chat room discussion about scale helis, and Top Gun came up. David asked, "Has Frank Tiano ever been asked to include scale helis at the Top Gun event?" The answer was no, so David emailed a note about it to Frank. To David's surprise, Frank said, "Bring them on!" After that, David went to work lining up sponsors, contestants and a host of other behind-the-scenes activities to bring the special event together.

To test the waters, this year's heli participation was for static competition only. Frank felt that such a test was needed to see how helicopters would be received at Top Gun, and from what I saw, they were very well received indeed! From the fixed-wing pilots and spectators to Frank himself, all were amazed at the quality, level of

Scale helicopters at Top Gun? I had heard earlier that scale helicopters were going to be there. When I arrived, I found that this was true, as the heli static judging had already begun. Seeking out the contest director

detail and sheer size of these spectacular machines. Curious modelers and spectators continuously eyeballed the helis and asked the builders questions.

ASK, AND THEY SHALL COME

So, who were the first heli contestants at Top Gun, and how did they get invited? David used the same criteria as for fixed-wing craft and invited the top scale heli modelers from around the U.S. and across the Atlantic.

The UK's premier scale modeler, Len Mount, accepted the Top Gun challenge and brought with him a very large, scale, Eurocopter EC-155B Dauphin that he manufactures and sells worldwide. Other modelers in attendance were Dale Wilkins with his Aerospatiale

HELICOPTER AWARDS

Place	Name	Model	Static score
1	Peter Wales	Lama	96.833
2	Len Mount	Dauphin	96.667
3	Jerry Hicks	Bell 412	93.917
4	Russell Matteini	Long Ranger III	93.917
5	Mike Robbins	Apache	91.250



Completely detailed inside an, dx>u, f jflrMptmrff-fr gorgeous Aerospatiale Lama built by Peter Wales has the distinct H6ii6rHt" being the. very first Top Gun Helicopter winner. Powered by a Zenoah G-3ff gasoline engine, Peter's Lama looked as though he had sprinkled magic dvst onto a full-size Lama to miniaturize it for Top Gun. Peter also earned the Beat Civiliaii and Critics' Choice awards with his impressive helicopter.





Top to bottom: the fifth-place Heli award went to Mike Robbins for his impressive McDonnell Douglas AH-64 Apache. Excel mechanical parts and an O.S. .61 engine are buried deep within this good-looking Army attack helicopter. • Doug Bruns's Bell 47 was equipped with crop-dusting sprayers and hopper tanks. Doug took home a seventh-place award. An O.S. engine and Vario mechanicals control this popular whirlybird. • Missing the first-place slot by less than $\frac{1}{4}$ point was this Eurocopter EC-155B Dauphin built by Len Mount. The beautiful EC-155B also earned the Best Cockpit award.

Top to bottom: Russell Matteini earned fourth place with this "News 6" Long Ranger III. A Rossi .60 heli engine is used for power, and Vario mechanicals are used throughout. • Also from a Vario kit, Dale Wilkins' Aerospatiale Tiger Attack helicopter placed sixth. • Placing third was this colorful Bell 412 entered by Jerry Hicks. Jerry uses his own ScaleHouse fuselage kit and Excel mechanicals for this gas-powered model.

Tiger and Doug Bruns with his Bell 47. Renowned scale heli modeler Jerry Hicks was also there with his beautiful Bell 412, which he manufactures and sells. Rounding out the field was this year's WRAM show first-place heli winner Mike Robbins with his McDonnell Douglas AH-64 Apache, Russell Matteini with his Long Ranger III and Peter Wales and his scale Aerospatiale Lama. The level of precision shown on Peter's Lama was nothing short of amazing; not even the smallest detail was overlooked. It left me wondering how he shrank a full-size Lama!

Just like the fixed-wing contest, the helicopter competition was very close, as Peter Wales earned the first-place Top Gun Helicopter award, followed closely by Len Mount, who finished second by less than half a point.

So what does the future hold for helicopters and Top Gun? Much, I hope. There is talk of helis returning next year, and if everything works out, a flying competition will be held for them, as well. I can hardly wait!

SPECIAL AWARDS

Best Cockpit	Len Mount, Dauphin
Best Civilian	Peter Wales, Lama
Best Military	Mike Robbins, Apache
Critics' Choice	Peter Wales, Lama

HELI STATIC JUDGES

Bill DeVerna	Michael Bacon
Sean Curry	Len Bechtold
Steve Harris	

TOP 2001 GUN WINNERS

DESIGNER CLASS

Pos.	Pilot	Aircraft	Span (in.)	Weight (lb.)	Power	Prop	Radio	Plans/kit	Gear mfr.	Fuel
1	Foley	1/4.5 Bf-109E	86	24	Moki 1.8	18x10	JR PCM	Self	Platt	Omega
2	Zirol Jr.	1/6 Avenger	108	45	Eagle 4.2	Zinger 24x10	Airtronics	Self	Robart	Gas
3	Violett	1/6.7 F-100D	70	32	AMT	Turbine	JR	Self	BVM	Jet-A
4	Vaillancourt	1/6 Typhoon	97	35	Q-75	Zinger 24x12	JR	Self	Likes	Gas
5	Parenti	1/6.5 Fireball	72	20	YS 1.20	16x8	Airtronics	Self	Self	Byron
6	Roane	37% Shoestring	85	16	Saito 180	APC 16x8	Futaba	Self	—	Red Max
7	Benjamin	1/4 Aeronca K	108	15	AstroFlight 60G	18x12	Airtronics	Self	—	Sanyo
8	Underwood	1/6.7 Stormovik	83	19	K&B 100	APC 15x8	Airtronics	Self	Robart	K&B 500
9	Torres	1/6 Cessna O2A	91	23	O.S. 70 4c x2	Zinger 14x6	Futaba	Self	Self	Sig
10	Patton	1/4 T-34c	111	53	3W 4.9 Twin	24x10	Futaba	Self	Robart	Gas
11	Polapink	1/4 Pfalz D IIa	94	23	Moki 1.8	Zinger 18x8	Airtronics	Self	—	Cool Power
12	Zirol Sr.	1/4 Stearman N2S	87	32	Robart 7 Cyl.	24x12	Airtronics	Self	—	Home
13	Hayes	1/7 Ayres Thrush	83	15	RCV 120	15.5x12.5 4b	JR PCM	Self	—	Omega
14	Feroldi	1/4 Dh-2 Airco	113	35	Sachs 4.2	24x10	Futaba	Self	—	Exxon
15	Platt	1/4 Magister	102	25	Moki 2.10	APC 20x10	Futaba	Self	—	Wildcat
16	Nelson	1/4 Waco YK-57	93	32	Seidel 7 Cyl.	Moki 22x10	Airtronics	Self	—	Red Max
17	Fogarty	1/4 Ercoupe 415D	90	22	Moki 1.8	APC 18x8	Futaba 9z	Self	Self	Wildcat
18	Wilkinson	1/6 Stuka Ju-87A	90	21	G-38	18x6-10	Airtronics	Self	Self	Gas

EXPERT CLASS

1	Nitsch	1/6 Rafale B-01	61	35	AMT	Turbine	JR	BVM kit	BVM	Jet-A
2	Hahn	1/7 P-61 Blk. Widow	114	45	G-38 x2	20x10	JR PCM 10x	Zirol plan	Robart	Shell
3	Miller	1/4 Globe Swift	80	22	O.S. 160 Twin	Zinger 16x6-10	Airtronics	Scratch	—	C. Power
4	Foster	1/4 de Havilland 9H	110	17	Laser 150	Zinger 18x6	Futaba 8	J. Bates plan	—	Wildcat
5	Tacie	1/4 Aeronca L-16A	105	14	O.S. Ft 160	Master 16x6	Airtronics	Nosen kit	—	Wildcat
6	Diaz	1/6 RAFALE B-01	68	40	RAM 750 x2	Turbine	Graupner	BVM kit	BVM	Jet-A
7	Rice	1/6.5 Ki-61 Tony	86	19	O.S. 1.08	APC 15x8	Airtronics	Smith plan	Platt	Wildcat
8	Campana	1/6 F-16	58	28	RAM 1000	Turbine	Futaba	Av. Design kit	Air Magic	Jet-A
9	Barbee	1/3 WACO YMF-5	110	45	3W 120cc	32x10	Futaba	Proctor kit	—	Gas
10	Chevalier	1/3 Tri-Pacer	120	39	ZDZ 60 RV	Clark 24x8	Futaba 8	Scratch	Effinger	Gas
11	Sousa	1/4 Culver Cadet	89	19	O.S. 160	18x6	Airtronics	Clements plan	CJM	Morgan
12	Steffes	1/6 P-47D	92	35	Sachs 5.8	Moki 26x10	Airtronics	Zirol plan	Ancco	Gas
13	Kretz	1/2 Dornier Do-23G	84	14	O.S. 40.4 Cyl. x2	11x6	Futaba	MAN plan	—	Omega
14	Mirandes	1/6 P-80A	70	20	RAM 750	Turbine	JR	BVM kit	BVM	JP4
15	Hendrickson	1/4 T-34A	109	52	Z-445	Bolly	JR 10x	Aero Mag.	Robart	Gas
16	Gross	1/4 SE5a	80	22	G-38	20x6	JR PCM	D. Bryant plan	—	Gas
17	Winter	1/4 Tiger Moth	88	24	G-38	20x6	Futaba	Barkley kit	Self	Gas
18	Johnson	1/6 P-36 Curtis	82	18	Moki 2.1	APC 20x10	JR 10x	Bates plan	Robart	Omega
19	Czikk	1/6 F-82B	102	36	Cheetah 42 x2	16x10	Airtronics	Johnson plan	JMP	Gas
20	Matthews	1/7 F-18 Hornet	72	50	RAM 750 x2	Turbine	Futaba	Yellow kit	Yellow	Jet-A
21	McCaulley	1/6 T-33A	85	28	RAM 750P	Turbine	JR	JMP kit	JMP	Jet-A
22	Denicola	1/6 Skyraider	100	35	3W-60	22x12	Futaba 9	Zirol plan	Likes	Gas
23	Snyder	1/6 Spitfire Mk.9	89	24	G-62	22x10	JR	Yellow kit	Yellow	Wildcat
24	Rafalowski	1/6 T-33A	82	32	RAM 1000	Turbine	JR	JMP kit	JMP	Jet-A
25	Weiss	1/6 MiG-15	68	23	AMT	Turbine	JR	BVM kit	BVM	Jet-A
26	Alvarez	1/6 F-86F	76	22	RAM 750	Turbine	JR PCM 10	Rhom	FiberClassics	Jet-A
27	Bartkus	1/6 Focke Wulf 190	80	22	Moki 1.8	APC 18x8	Futaba	Holman/Bryant	Self	Wildcat
28	Voglund	1/6 Me-110	118	39	Laser 150 x2	16x8	JR	Smith	Century Jet	Wildcat
29	Benson	1/6 Beech T-34C	80	22	Moki 1.8	16x8 3-blade	Futaba 9z	R. Torres	Robart	Sig-Fai

TEAM CLASS

Pos.	Builder/pilot	Aircraft	Span	Weight (in.)	Power (lb.)	Prop	Radio	Plans/kit	Gear mfr.	Fuel
1	Stevik/DiGiorgio	1/4.5 P-51D	102	36	3W 80	24x12	JR	FiberClassics	FiberClassics	Gas
2	Maiorana/Pinegar	1/6 TU-4	115	27	MaxCim x4	13x10	Futaba	—	—	Electric
3	Leonard/Malchione	1/6 F-4 Phantom	52	26	RAM 1000	Turbine	JR	BVM	BVM	Jet-A
4	Grice/Shulman	1/6 Rafale	64	35	RAM 1000 x2	Turbine	JR	BVM	BVM	Jet-A
5	Schmidt/Zoun	1/3 Zlin-526	106	24	3W-70	22x10	Futaba	German	—	Gas
6	Siewert/Sandquist	1/6 P-47	82	31	Brisson 4.2	Zinger 22x10	Futaba	Aerotech	Robart	Gas
7	Salles/Estevés	1/3 Spacewalker	104	22	Eagle 3.2	Moki 22x10	JR	Sig	—	Gas
8	Cassidy/Stokes	1/6 P-47	80	30	G-45	18x10	Futaba	Yellow	Robart	Gas
9	Donofrio/Greco	1/4 Sikorsky S-39B	156	45	B&D 5.1	Syntec	Futaba	Self	—	Gas
10	Araujo/Gonzalez	1/7 Rafale B	64	38	RAM 1000	Turbine	Airtronics	BVM	BVM	Jet-A
11	Mears/Patrick	1/3 Super Cub	144	42	Moki 3.6	24x10	Futaba	—	—	Special
12	Berastain/Swift	1/4 PT-19	114	36	G-62	Moki 22x10	Futaba	Zirol plan	—	Gas
13	Berton/McCallie	1/6 Zero M3 Hamp	91.5	31	3W 70cc	22x12	JR	Platt plan	Century Jet	Gas
14	Mangudo/Testa	1/6 SNJ-5	101	25	G-62	Moki 22x10	Airtronics	Zirol plan	Robart	Gas
15	Selby/Lim	1/6 F7F Tigercat	122	48	3W 48	21x12	Graupner	FFC	Robart	Exxon
16	Tiano/Christensen	1/4 F8F Bearcat	101	46	3W 120B1	Menz	JR	3W	Century Jet	Gas
17	Michel/Durrstein	1/6 Airbus A-330	150	49	Jet Cat P80	Turbine	MC-24	Michel	Hawe	Jet-A
18	Hogan/Patton	1/6 Panther F9F	85	38	AMT 280	Turbine	JR	CAI	Robart	Jet-A
19	Frankel/Stern	1/7 Skyray F4D-1	59	25	RAM 750	Turbine	Futaba	Self	Platt	Jet-A
20	Elias/Shaw	1/6 FW-44	71	17	Aveox	Moki 16x10	Futaba	K&W	—	Electric

Finish	Static score	Flight score	Total
Polyester resin & K&B	97.083	94.458	191.541
Auto paint	97.583	93.792	191.375
PPG Automotive	96.5	94.833	191.333
Acrylic lacquer	94.833	90.458	185.291
Glass and Hobby Pox	91.417	92.167	183.584
Super Coverite/dope	93.167	89.583	182.75
Stitts System	96.500	86.167	182.667
Cloth, Coverite, paint	91.667	90.542	182.209
K&B Epoxy	94.417	87.5	181.917
PPG Automotive	90.75	90.583	181.333
Sig dope and fabric	95.917	83.5	179.417
Stitts	91.75	86.083	177.833
Glass and K&B paint	93.75	83.292	177.042
Sig Coverall/dope	94.583	71.583	166.166
Hobby Pox	90.667	75.417	166.084
Stitts	95.917	37.292	133.209
Cloth and Du Pont paint	95.333	0	95.333
Acrylic enamel	89.833	4	93.833

PPG Automotive	96.25	95.542	191.792
Zpox w/auto acrylic	94.833	96.417	191.25
Polyurethane	94.417	93.458	187.875
Auto Acrylic	93.917	92.375	186.292
Sig dope	93.25	92.75	186
PPG Concept	94.333	90.208	184.541
PPG	91.667	91.5	183.167
PPG	93.917	88	181.917
Stitts w/auto acrylic	94.667	86.417	181.084
Coverite butyrate dope	95.5	85.083	180.583
Stitts System	93.917	86.167	180.084
PPG	91.083	88.958	180.041
Chevron paint	92.25	87.625	179.875
PPG	88.333	91	179.333
PPG Automotive	91.083	87.875	178.958
Dope, lacquer	96.583	81.833	178.416
Stitts	90.167	86.375	176.542
Hobby Pox	85.083	89.458	174.541
Auto lacquer	87.25	86.875	174.125
PPG Concept Series	91.25	81.083	172.333
PPG Automotive System	92.083	76.625	168.708
Fiberglass & Hobby Pox	88.333	47.375	135.708
PPG Auto	77.417	17.042	94.459
PPG	92.417	0	92.417
PPG	88.667	0	88.667
Capt'n Butch Aluminum	88	0	88
PPG	87.417	0	87.417
Hobby Pox	86.417	0	86.417
Lacquer/clearcoat	86.25	0	86.25

Finish	Static score	Flight score	Total
Nitrate dope	96.25	95.125	191.375
Aluminum foil tape	96.917	94.167	191.084
PPG Concept paint	97.333	92.708	190.041
PPG	97.75	90.875	188.625
PPG	95.083	93.333	188.416
PPG auto paint	97.25	91.125	188.375
Auto enamel	97	89.417	186.417
Aluminum sheets	94	91.708	185.708
Randolf dope	97	88	185
PPG auto paint	94.333	89.708	184.041
Endura	97.833	85.167	183
Automotive finish	92.25	90.125	182.375
Hobby Pox	96.583	85.125	181.708
PPG	89.667	90	179.667
PPG	91.833	86.958	178.791
Hobby Pox	90.583	79.25	169.833
Original Airbus paint	95.667	15.833	111.5
PPG System	91.75	6,958.,	98.708
PPG	92.75	0	92.75
Solartex/enamel	90.417	0	90.417



Top: a heckuva lot of people behind the scenes make Top Gun the great event that it is. Here, all the judges take a break from their appointed rounds to smile for our camera. A better, more experienced group of hard workers could not be found anywhere. Above left: that's Bob Curry on the right with his friend, Lee Henderson, taking a break from the rigors of static judging. Bob has been a judge for all 13 years of Top Gun. Now, that's dedication! Above right: regular Model Airplane News contributor and past Top Gun contestant Rich Uravitch donned the Craftsmanship Judge cap at the 2001 event. Here, he closely inspects Bob Violett's F-100D.



Top to bottom: Dave Plait again competed in Designer Scale with his 1/4-scale Miles M. 14 Magister. Dave's British trainer, which placed 15th, spans 102 inches and is powered by a Moki 2.10. • Flown by Kalvin Lim, this twin 3W-48-powered Tigercat comes in for a landing. Mike Selby's colorful F7F won the Critics' Choice award and placed 15th in Team Scale. • Awarded both the Best Military and the Charlie Chambers Craftsmanship awards, this Russian TU-4 is the team entry of George Maiorana and David Pinegar. Powered by four MaxCim electric motors, the Soviet B-29 copy placed second.

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TOP 2001 GUN

TURBINES RULE THE JET WAYS

It's no surprise that at an event where the hobby's very best is represented, every model is a showstopper. That goes for the WW I fighters, the civilian cabin planes and the WW II bombers. The jets, however, get most of the oohs and aaahs at Top Gun! And for the second year in a row, all the jet pilots competing at the Polo Grounds used turbines to power their "wow" machines.

Why? Beside the obvious sound and distinct smell emitted by these kerosene-burning powerplants, the main reasons for the switch to turbine power are reliability and power. Several very good flying models that were once powered by ducted-fan units are now great flying models that enjoy an abundance of turbine push. Practically every day, the prices of these impressive engines decrease a little more, and their complexity is now at a level where most, if not all, serious scale competitors can easily and safely operate them with a minimum of effort.

Will turbine models someday replace well-established ducted-fan-powered jets? Probably not; but at Top Gun, turbines rule the jet ways!



Coming in for a "down and dirty" pass, Bob Violet's North American F-100D shows its impressive slow-speed characteristics. Powered by an AMT turbine, the Super Sabre has a 70-inch wingspan. Bob won the Best Jet award and placed third in Designer Scale.



Above, left to right: powered by a RAM 750, this beautifully finished F-86F Sabre jet built by Rene Alvarez has an impressive 76-inch span. The 22-pound model is from a FiberClassics kit and is covered with Capt'n Butch aluminum. * Finishing eighth in Expert, this colorful F-16 Fighting Falcon was built by Gustav Campana from an Air Magic kit. Powered by a RAM 1000 turbine, the model has a 58-inch span and a PPG finish.

• Entered in Team Scale by Mark Frankel and Kerry Sterner, this beautiful F4D-1 Skyray,

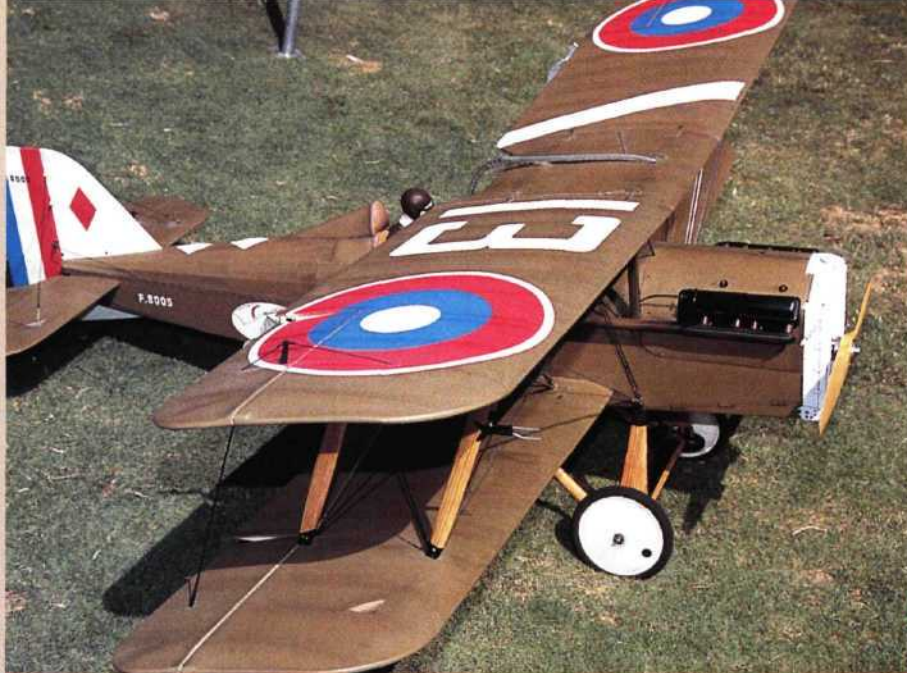
Mark's own design, was powered by a RAM 750. The 1/12-scale jet has a 59-inch span. Second row, left to right: powered by twin Jet Cat P80 turbines, this striking Airbus A-330 was the Team entry of Peter Michel and Stephan Durrstein. The scratch-built 150-inch-span airliner was 1/16-scale and weighed

49 pounds. • Built from a Yellow Aircraft kit, this F-18 placed 20th in Expert. Built by Davie Mathews, the Hornet is powered by two RAM 750 turbines and has a 72-inch span.

Left: Lewis Patton (kneeling, center) talks about his Crow Aviation F9F Panther. Entered in Team Scale with Hogan Selby, the Panther is powered by an AMT280 turbine and has an 85-inch span. Below left: placing 14th in Expert, this P-80 is the work of Frankie Mirandes. Built from a BVM kit, the P-80 is powered by a RAM 750 and has a 70-inch span.



Flown by Dave Malchione Jr. in Team Scale with Sam Leonard, this F-4 Phantom is powered by a RAM 1000. It came in third.



For the contestants and their crews, having the opportunity to compete at this remarkable scale event is rewarding in itself. When I arrived on Thursday, most of the competitors had already set up camp, and many were preparing to have their models static-judged. Others were putting in a few test flights. Though the weath-

High Static Expert winner Mike Gross prepares for another flight with his SE5a biplane. The G-38-powered, 1/6-scale British fighter was built using a Dennis Bryant plan and has an 80-inch wingspan. Mike came in 16th.



STATIC AWARDS

	Pilot	Aircraft	Sponsor
High Static—Designer	Zirolì Jr.	Avenger	Aerotech
High Static—Expert	Gross	SE5a	RA Microjets
High Static—Team	Mears	Super Cub	Ray & Robin's Hobby
Best Civilian Aircraft	Michel	Airbus	Dave Platt Models
Best Jet Aircraft	Viptett	MOOD Super: Sabre	Irrigation Services
Best Military Aircraft	Maiorana	TU-4	Futaba
Best Biplane	Nelson	Red WACO	RC Report
Charlie Chambers Craftsmanship	Maiorana	TU-4	The ZAP Gang
Best Pre-WW II Aircraft	Feroldi	DH-2	Glenn Torrance
Engineering Excellence	Michel	Airbus A-330	Robart Mfg.
Best Cockpit Interior	Hahn	P-61	Scale Intl.
Critics' Choice	Selby	F7F Tigercat	Airtronics/Van Dell Jewelers
Grej Eagle lifetime Achievement	Parenti		Model Airplane News
Top Buns	Barastain		Top Gun Hussies

FLIGHT AWARDS

Best 2-stroke Performance	Foley	BF-109E	Moki Engines
Best 4-stroke Performance	Tacie	Aeronca	Saito Engines
Best Gas Performance	Hahn	P-61	Aircraft Intl.
Best Multi Performance	Hahn	P-61	Ron Norris



er was warm and sunny at the start of the weekend, the infamous "Polo Grounds crosswind" persisted and really gave the pilots a workout. Many who were flying lightly loaded WW I and high-wing aircraft wisely chose to use alternate runways to help compensate for the wind direction.

Top Gun has three categories of competition: Expert, Team and Designer Scale. Before the flying begins, everyone's model is static-judged. Over the years, Frank Tiano has put together one of the most experienced teams of judges seen anywhere. Chief judge Bill Holland, assisted by Bill Deverna, guided the many static and flight judges during the event, and it was amazing how quickly and thoroughly all the models were judged. (Of particular note was Bob Curry, who has been a Top Gun static judge since the competition's inception in 1988—quite a testament to the level of experience found among the event's judges.) Because of a threatening storm on Sunday, however, only four flight rounds were flown this year.

Twenty-nine aircraft were entered in Expert, 18 in Designer and 20 in Team scale. As it was last year, all of the jets at Top Gun were turbine-powered; no ducted-fan aircraft were present. This was the first year that scale helicopters were a part of the event, and the helis that showed up for the static judging were amazing (see the sidebar, "Helicopters make the scene at Top Gun").

Left, top: Nick Zirolì Jr.'s 108-inch-span TBM Avenger/Tarpon came in second in Designer and earned the highest static score in Designer Scale. Left, bottom: the highest static score in Team Scale went to Graeme Mears and his 1/6-scale PA-18. Powered by a Moki 3.6, the Super Cub has a 144-inch span.

The Pilots of Top Gun

by Roy Vaillancourt

Who really flies these marvelous miniature aircraft we see at Top Gun? Most people think it is the guys on the ground holding the transmitters. But the competitors know that the really brave ones are the little guys sitting in the models' cockpits. Most scale modelers spend countless hours applying fine details such as rivets, screw heads and panel lines to the surfaces of their models, but the scale illusion isn't complete without the human element. The person who lives and works in the cockpit must also be represented. The pilot figure is a very important part of any truly scale model aircraft.

At all major scale meets like Top Gun, you'll see scale pilot figures that show as much detail as the airplanes themselves. Some are so realistic that you expect them to talk to you. Most of these little fellows start as kits available from any number of manufacturers, and with a little paint, time and patience, they can be made to look very lifelike. Little extras like goggles or an oxygen mask and hose can really make a difference. Adding many other little items can really make a pilot figure stand out.

When spectators view a scale model up close, their eyes are naturally drawn to the space where the pilot sits: the cockpit. If the front office is vacant or has a funny-looking doll sitting in the pilot's seat, the scale illusion is incomplete, and the overall effect of an otherwise accurately built and detailed model is somehow diminished. Real planes are flown by real pilots, and scale planes should always be "flown" by scale pilots.



Electric-powered aircraft continue to participate and show the excellent performance these quieter models possess. In my opinion, the most spectacular electric was the Russian TU-4 (B-29 copy) built by George Maiorana and flown in Team by David Pinegar. Its performance was solid, and its flight realism was outstanding. Of course, there were many outstanding models; each modeler at Top Gun represented

the very best that our hobby has to offer.

Top Gun is all about flying the best scale models, and this year's crop of aircraft was the best I've ever seen. Though this year's scale competition was very close, it was not without its casualties. The most heartbreaking loss, I believe, was the crash of Peter Michel's beautiful, twin-turbine-powered Airbus A-330. Piloted smoothly for several flights by team partner Stephan Durrstein,

the impressive 150-inch-span passenger jet airliner got caught up in a stiff crosswind and went in. Peter has promised to have a new Airbus for next year's event.

A SHOW WITHIN A SHOW!

Just like the scale competition at Top Gun, the event's halftime show is a joint effort by the show's best pilots and is an extravaganza beloved by the many spectators and con-

Second place in Expert went to this P-61 Black Widow built and piloted by Greg Hahn. Powered by two G-38 gas engines and built from a plan by Nick Zirol, the impressive model also earned the Best Cockpit Interior, Best Gasoline Engine Performance and Best Twin Engine Performance awards.



TOP 2001 GUN

testants. Orchestrated by Lanier RC's own Bubba Spivey, the halftime production holds many surprises that repeatedly bring the crowd to its feet.

It began with a demonstration of multiple RC parachute drops and was quickly followed by the hot-dog hijinks of Bubba and his wingman, Wayne Voyles, both of whom flew giant Stingers. These Zenoah G-62-powered, smoke-belching models performed aerobatics in formation, often very close to each other—and to the ground. A rather noisy highlight of the show was the mock breaking of the scale sound barrier by a turbine-powered jet piloted by Terry Nitsch (also known as the 1/8-

Top Gun Tech Talk

ENGINES

Zenoah	9
3W	8
Moki	8
O.S.	6
Eagle	2
Laser	2
Sachs	2
B&D	1
Brisson	1
Cheetah	1
K&B	1
Quadra	1
Robart	1
RCV	1
Saito	1
Seidel	1
YS	1
ZDZ	1

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JR	23
Airtronics	16
Graupner	3

AIRCRAFT TYPES

Monoplanes	59
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WW II	27
Jets	16
Civilian	13
Biplanes	9
WW I	5

RETRACTS

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BVM	8
Scratch-built	6
Century Jet Models	4
Jet Model Products	3
Platt	3
Likes Line	2
Yellow A/C	2
Air Magic	1
Anco	1
Effinger	1
FiberClassics	1
Hawe	1

TURBINES

RAM	11
AMT	4
Jet Cat	1

ELECTRICS

AstroFlight	1
MaxCim	1
Aveox	1



Piloted by Lee Rice, this KI-61 Tony placed seventh in Expert Scale. The 86-inch-span Japanese fighter is powered by an O.S. 1.08 and was built from a Don Smith plan.

scale "Captain Salami"). In constant contact with the crowd via radio, Terry flew his BVM jet to a great height and then did a speed run down the centerline of the Polo Grounds. When the model was at center stage, a small pyrotechnic charge was fired to good effect.

Another show favorite was Don Muddiman and his model, the Flying Machine. Don performed some of the wildest hot-dog aviation ever seen from such a small, unassuming plane. Gary Wright wowed the crowd with his 3D aerobatic helicopter demonstration. What he did with a heli was truly magical—would you believe sustained knife-edge flight that almost seemed to defy gravity? To close the show, flying prodigy Jason Schulman did his usual unbelievable job flying a 3D, aerobatic sequence using a Lanier 42-percent-scale Sukhoi powered by a Desert Aircraft DA-150cc gas engine. These pilots and many others made the halftime show itself worth the price of admission.

Left, top: Nick Zirol Sr. piloted his beautiful Stearman N2S to 12th place in Designer Scale. The 87-inch-span biplane is powered by a Robart 7-cylinder radial 4-stroke engine. **Left, center:** Bob Benjamin competed with his electric-powered Aeronca K cabin plane and placed seventh in Designer. The beautiful 1/4-scale model is powered by an AstroFlight motor. **Below left:** third-place winner in Expert was Corvin Miller with his Globe Swift. The scratch-built civilian airplane has an 80-inch span and uses an O.S. 1.60 twin-cylinder engine for power. **Below right:** placing 16th in Designer, Charlie Nelson flew his 1/4-scale WACO YK-57 cabin biplane. Powered by a Seidel 7-cylinder engine, the big biplane had a wingspan of 93 inches. **Bottom:** the team entry of Frank Tiano and John Christensen was this big (101-inch-span) 1/4-scale F8F Bearcat built from the 3W kit. Powered by a 3W 120B1 twin-cylinder gasoline engine, the big Bearcat weighed 46 pounds. The team placed 16th.

ACCOLADES

Of course, Top Gun couldn't happen without the generosity of the many sponsors who donate cash, prizes and awards. To all of them, to the Palm Beach Aero Club members and to tireless event promoter Frank Tiano goes the biggest thank you. If you love seeing beautiful scale models flying and competing head to head, put Top Gun on the top of your must-see list.

In 2002, Top Gun will not be held at the West Palm Beach Polo Grounds. It's time for a new venue, and Frank is currently talking with representatives of several promising new locations. One thing is definite: wherever the next Top Gun is held, it will be bigger and better than ever. Frank wouldn't have it any other way. ✦

HOBBY PEOPLE

Yak-18

An easy-to-fly **ARF**
Russian warbird

by Bob Van Tassel

Approximately 7,000 Yak-18s were produced in the USSR and Hungary between 1946 and 1957. This aircraft was designed as a primary trainer, and like so many Soviet aircraft, it was built to withstand the rigors of rough-field takeoffs and landings. It had a rugged tricycle landing gear and a powerful, easily serviced radial engine. The airframe was steel tube with a mixture of metal and fabric covering. The full-size plane had a distinctive sharp dihedral.

Hobby People offers a terrific sport-scale ARF model of this legendary plane that comes with nearly everything you need except the engine and radio gear. The instruction manual is complete and provides you with all the necessary information.

The model is constructed almost entirely of lite-ply, balsa and foam and has a factory-painted fiberglass cowl. It's finished with a heat-shrink polyester covering and decals. The manufacturer recommends that you

use a .36 to .46 2-stroke or a .40 to .52 4-stroke engine, so I installed a Magnum XL-40A, which performed beautifully with the Yak.



Model: Yak-18

Type: ARF sport-scale trainer

Manufacturer: Hobby People

Distributors: Hobby People and Global
Hobby Distributors

Wingspan: 54.5 in.

Wing area: 460 sq. in.

Weight: 5.5 lb.

Wing loading: 27 oz./sq. ft.

Length: 42.5 in.

Engine req'd: .36 to .46 2-stroke or .40 to .52
4-stroke

SPECIFICATIONS

Engine used: Magnum XL-40A

Prop used: Global 10x6 (included)

Radio used: Futaba T6XA

Radio req'd: 4-channel with 5 servos
(engine, rudder, elevator, 2 ailerons)

Price: \$124.99

Features: high-quality materials and construction; wrinkle-free, iron-on covering with decals; and factory-painted, fiberglass cowl with forward openings already cut; complete

FLIGHT PERFORMANCE

Since I broke in the XL-40A on a test stand, it fired right up. I made some minor engine adjustments, faced the Yak-18 into a 15mph wind and let it go.

• TAKEOFF AND LANDING

I held the Yak on the ground using some down-elevator until it was out about 50 feet, and it accelerated rapidly. With a small amount of up-elevator, it jumped into the air. It needed only a few minor trim changes. I did a number of passes before taking it upstairs to check the stall, but there were no unpleasant surprises.

Gradually reducing power and altitude, I brought the Yak in for a final approach. I kept a small amount of power on and was careful not to over-control it. When it was about 2 feet off the ground, I reduced power to idle, and the Yak settled in on the main gear.

• SLOW-SPEED PERFORMANCE

At slow speed, the flight performance was very respectable. Slow passes over the field were straight, and all of the controls were responsive. The Yak flies like any other low-wing sport airplane.

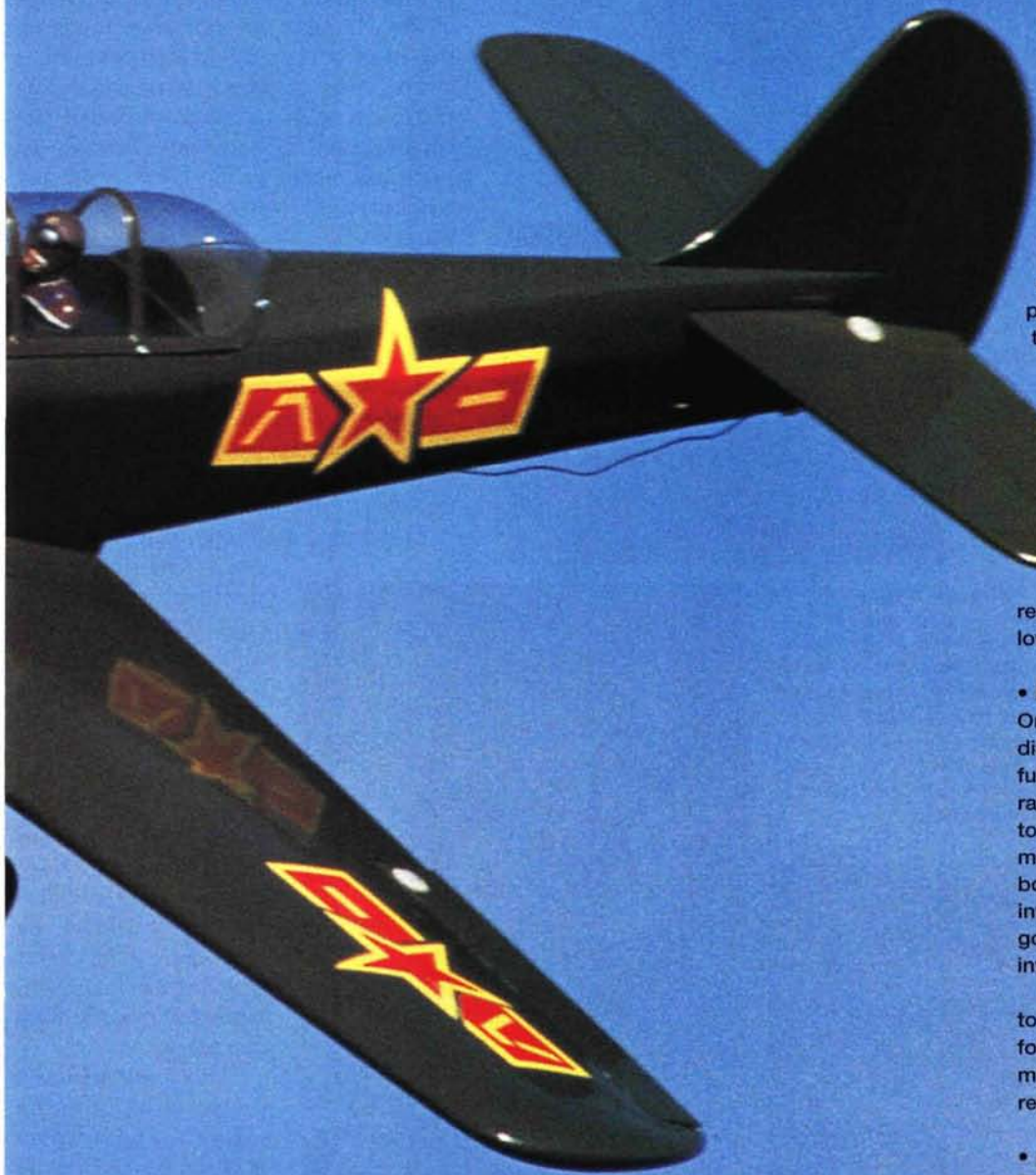
• HIGH-SPEED PERFORMANCE

On the first flight, the pushrod became disconnected from the throttle servo at full speed, and the Yak was off to the races. This gave me a great opportunity to check the plane's high-speed performance. With the XL-40A going at full bore, I tried to get it to quit by flying inverted, but I had no luck. It just kept going through 10 minutes of high-speed inverted flight.

I tried to take the Yak from the deck to the heavens, and though vertical performance was not unlimited, it did strain my eyes. All the controls were very responsive at both low and high rates.

• AEROBATICS

The Yak can do it all. I was pleasantly surprised by its capabilities, especially given its low cost. Loops were straight and tight at high and low rates and at slow and fast speeds. Rolls were axial at high and low rates and very rapid at high rates and high speed. It also tumbled well. The Yak performed every maneuver I attempted.



hardware, including wheels, tank, pushrods and a 10x6 propeller; detailed manual contains over 55 photos and diagrams.

Comments: the Yak-18 is an excellent choice for a first warbird. The kit is complete and very easy to assemble. It took me longer to read the well-written manual than it did to assemble the plane.

Hits

- Well-written instruction manual.
- Quick and easy assembly.
- Fine-quality construction materials.
- Good flight performance.
- Complete hardware package.

Misses

- Quick connectors do not hold well. (They can be better secured by adding wheel collars to both sides.)



The Yak-18, straight out of the box.

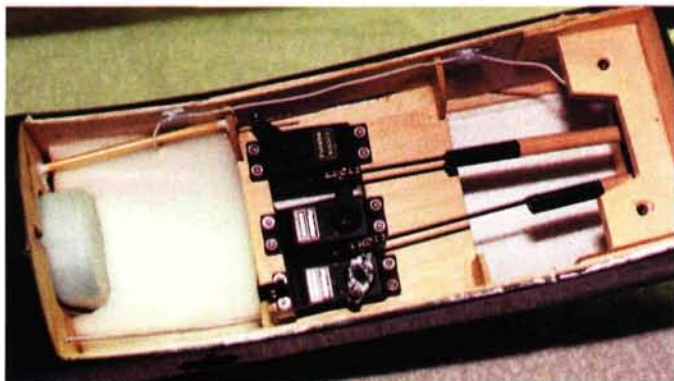
ASSEMBLY

I first assembled the wings, which are balsa covered and have foam cores. I attached the ailerons by opening the pre-cut hinge slots with a modeling knife, inserted the CA hinges halfway into the wing and secured them with pins. I pushed the ailerons onto the hinges and checked for deflection. I removed the pins and secured the hinges with thin CA, then I deflected the hinges a few times to make sure that the CA had wicked in and that the ailerons moved freely.

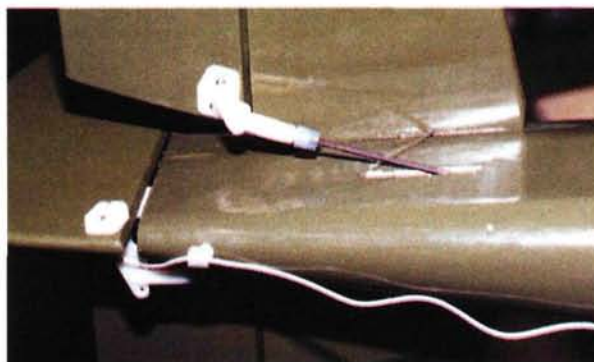
Following the instructions, I attached the two aileron servos to the servo hatches and removed the covering from the servo pockets. I used a simple jig to mark and drill the holes for the screws that



Above: the Magnum XL-40A was easy to install and needed only minor adjustments. Right: here, you can see the holes that I cut for the cylinder head and the muffler, as well as those for access to the muffler-mounting screws and the needle valve.



Above: the Yak has an extremely roomy fuselage, so there was no problem installing the servos and pushrods. Right: a Y-connector and pushrod control the two-piece elevator assembly. Be sure to check the alignment before you epoxy the assembly into place.



hold the hatches in place. Then I routed the aileron wires through predrilled chases to the center of the wings, where they exited through the top. I used 6-inch extensions on the aileron servos.

I set the dihedral using a plywood dihedral brace and joined the wing halves with 30-minute epoxy; then I taped the halves together to dry.

I opened the two slots on the underside of the wing that accommodate the landing-gear wires and inserted them. I secured them in place with two mounting straps on each gear and installed the wheels using the supplied hardware. To avoid having flat spots, I try to avoid any weight on the wheels when storing the wings.

The front of the wing is held in place with a plug, which I inserted into the forward fuselage former. I secured the wing doubler to the rear of the wing, lined it up and drilled the hole for the 4x25mm machine screws. Finally, I cut the body fillet from the vacuum-formed plastic and secured it to the front of the underside of the wing.

I then turned my attention to the tailpieces. The fin and the stabilizer are made of built-up balsa. The elevator consists of a two-piece assembly and is controlled by a Y-connector on the pushrod. I simply installed the CA hinges, removed the covering from the center section of the horizontal stabilizer and opened the slot in the fuselage, and after checking the alignment, I epoxied the assembly into place.

After I had removed the covering from the base of the fin, I assembled the fin and rudder in the same manner and epoxied them to the fuselage. The manual

covers this procedure in detail.

The fuselage is constructed of lite-ply, balsa and foam. The nose-gear-mounting brackets came already attached to the painted firewall. I lined up the control horn for the gear and drilled holes in the firewall for the pushrod and the throttle-control cable.

The Magnum XL-40A was a perfect fit and easy to install. The cowl installation was simple and straightforward, as well.

YAK-18 ARF

I simply cut holes in the bottom of the cowl for the cylinder head and the muffler. I also drilled access holes for the muffler mounting screws and the needle valve.

The precut openings in the front of the cowl provided great ventilation. The rear of the cowl is not made to fit flush with the sides of the fuselage, and this allows plenty of air to exit. Four screws join the cowl to blocks on the firewall. I assembled the supplied tank and installed it in the fuselage using a three-line system. The tank stopper is inserted into a hole in the firewall. I used red fuel tubing to connect the fuel tank to the exhaust and installed the supplied fuel filler and plug at the bottom of the cowl to keep it out of sight.

There is plenty of room in the fuselage to install servos side by side and still easily route the pushrods. I used the supplied dowel pushrods and quick connectors on the servo-output arms. (The elevator uses a split pushrod.) Because the quick connectors did not hold as tightly as I wanted, I added a wheel collar to each side of the connector for safety; this is an easy remedy. I did not secure the throttle servo pushrod with wheel collars, and the pushrod became disconnected at full



throttle (see "Flight Performance").

I installed the receiver in front of the servos toward the rear of the fuel tank.

I placed two figures in the cockpit: an instructor and a student. I trimmed the pre-painted canopy and attached it to the fuselage using double-sided clear tape and eight small screws. I routed the antenna so

that it exits through the bottom of the plane and threaded it through small pieces of fuel tubing, which I had already attached to the bottom of the fuselage. I attached the prop and supplied spinner nut and set up the plane for initial sport flying, following the manufacturer's recommendations. When I checked the balance, it was right on the money!

CONCLUSION

I was impressed by the overall quality of this kit. The Yak-18 is an easy-to-fly warbird, thanks to its trike gear, high tail grouping and light wing loading. This well-constructed plane is also one of the most complete ARFs I have ever seen. If you are looking for an aerobatic plane with scale-like appearance that's a step up from a low-wing trainer, then look no further; this is the plane for you! ✈

Futaba Corp. of America, distributed exclusively by Great Planes Model Distributors Co., P.O. Box 9021, Champaign, IL 61826; www.futaba-rc.com. **Global Hobby Distributors**, 18480 Bandilier Cir., Fountain Valley, CA 92728-8610; (800) 854-8471; (714) 964-0827; fax (714) 962-6452. **Hobby People**, (800) 854-8471; hobbypeople.net. **Magnum**; distributed by Global Hobby.

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SPECIFICATIONS

Name: Ultimate ARF

Manufacturer: Dave Patrick Models

Type: biplane

Wingspan: 60½ in.

Length: 64½ in.

Weight: 10½ lb.

Wing area: 1,230 sq. in.

Wing loading 19.6 oz./sq. ft.

Engine req'd: .90 to 1.20 2- or 4-stroke

Engine used: Enya 1.20R 4-stroke

Radio req'd: 4-channel (rudder, aileron, elevator and throttle), with four aileron servos required

Radio used: JR 10X w/DS-8231 digital servos and 1800mAh receiver battery pack

Price: \$399.99 (as reviewed); \$379.99 (white covering); \$349.99 (ready to cover)

Comments: the Ultimate ARF is a high-performance biplane with excellent handling characteristics. The model is available with 5-color film covering (as reviewed), covered in white and as an uncovered ARC (almost ready to cover.) It is very easy to assemble and requires only about 10 hours to complete.

HITS

- One-piece wings; no glue seams at center of wings.
- Excellent material quality throughout.
- Good hardware included.
- Painted cowl, canopy and cabane struts already installed.

MISSES

- None.

DAVE PATRICK MODELS

Ultimate ARF

A high-performance, aerobatic biplane that lives up to its name!



by Gerry Yarrish

The Ultimate biplane is one of those airplanes that just looks right. Everything about it says "high performance." From its two sweptback constant-chord wings and its ultra-sleek engine cowl to its humongous rudder and large, aerodynamically counter-balanced elevators, the Ultimate biplane is a beautiful example of the "form follows function" design philosophy.





Designed by Dave Patrick and distributed by his company, Dave Patrick Models, the ARF Ultimate is perhaps one of the best prebuilt aerobatic airplanes available today. The high quality of its construction materials and the high degree of prefabrication make the kit very easy to assemble. A comprehensive and well-illustrated 47-page instruction manual takes all the guesswork out of putting the model together, and I was able to assemble the Ultimate in less than 10 hours.

The Ultimate ARF comes completely covered in five colors of Ultracote film. The fuselage comes with the engine cowl, aluminum cabane struts and the smoked canopy already attached and painted to match the covering. The two, one-piece wings are completely built and covered, and even the aileron servo hatches are covered and taped into place. The interplane struts are covered and ready to be attached to the finished model. The formed, aluminum landing gear and fiberglass wheel pants are also painted and ready to go.

ASSEMBLY

The first step is to install the horizontal stabilizer. The fuselage comes with slots for the stab and vertical fin, and there's nothing

hard about installing the tail parts. Simply slide the surfaces into place, mark the covering where it has to be removed for proper gluing, remove it, and assemble the parts using your favorite adhesive. I used Anchor Bond 30-minute epoxy thinned with alcohol. Once the surfaces were in place, I installed the tailwheel assembly. It must first be inserted into the tail post, then its horizontal wire extends into the rudder's LE.

All the CA-style hinges come installed but are not glued into place. It takes only a few minutes to glue them securely with

thin CA. Once the rudder and elevator halves have been hinged, you can cut through the fuselage covering material to expose the slots in front of the stab and install the pull/pull cables. The kit comes with all the hardware needed to make the pull/pull control system and includes 49-strand, nylon-coated cable, brass cable swages, 2-56 threaded connectors and plastic control horns and clevises. By being very careful while you make the various cable sets, you will have enough cable left over to make the tail-bracing wires. You will have to install the rudder and elevator servos before you can complete the cable control installation. Take your time here, and make sure everything operates properly without any internal snags or kinks.

The next step is to install the landing gear, axles, wheels and wheel pants. This goes very quickly, as the landing gear comes already drilled for the attachment bolts and the wheel pants come with plywood doublers already glued and fiberglassed into place. Simply install the axle assemblies and wheels, then slide the wheel pants over the wheels. The pants already have slots cut into them to slip over the axles. When the parts are in the correct position, drill a pilot hole in them using the hole in the landing

You get a lot of prebuilt parts with the Ultimate ARF kit. The wings are one piece.



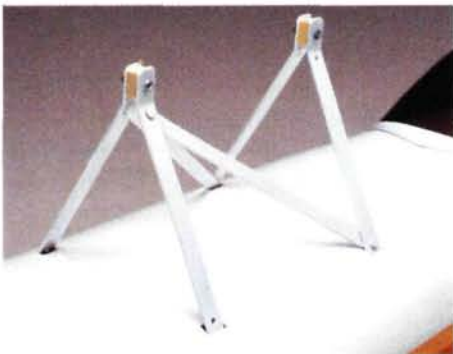
gear as a guide. Enlarge the hole and then install a 4-40 blind nut in the ply doubler. Secure the blind nut with epoxy or thick CA. Reinstall the pants and install a 4-40 cap-head screw to hold each of them securely in place. With the gear completed, I finished the radio installation and inserted the receiver antenna wire into the plastic antenna tube that was already in place in the aft fuselage.

WING

Unlike most other ARFs, the Ultimate ARF comes with one-piece wings; no gluing required here, and no unsightly wing center seams either. Aileron servo installation is very easy because there are lengths of string taped into place inside the wing. Standard 12-inch extensions are required for the servo leads, and the string makes it easy to snake the wires through the holes at each wing's center. For added safety, I used lengths of large-diameter heat-shrink tubing shrunk over the connectors to secure the extensions to the servo leads. To complete the setup, I screwed the aileron servos to the servo hatches and then screwed the hatch plates into place. There are four ailerons (two per wing), and each has its own servo (four servos in all). This setup does require a pair of Y-harnesses, but it simplifies things by eliminating inter-aileron "slave" linkage. Four ailerons also make roll control very crisp and positive.

The kit comes with eight interplane strut-attachment fittings that you must screw into hardwood attachment blocks that come installed in the wings. The blocks are already threaded, and all you have to do is screw the attachment fittings into place. Don't glue them yet. When you install the wings, you have to adjust the wing incidence by screwing the fittings in or out of the blocks. Once the wings have been properly installed and the incidence is correct, you can glue the fittings into place with thin CA glue. The instructions for the wing-

The best thing about the Ultimate ARF is that the cabane struts come already installed and painted—a big timesaver.



FLIGHT PERFORMANCE

• TAKEOFF AND LANDING

The Ultimate has a large rudder that provides very positive yaw control. I had no problem keeping the model on track during the takeoff run. The Enya 1.20R turning an APC 15x6 prop produces gobs of power and a spirited climb. Advance the throttle slowly, and let the model accelerate gradually. The tail comes up in only a few yards, and my model was airborne before I applied up-elevator. I held the model in a shallow departure angle until it gained some airspeed. Aileron control is responsive as soon as you lift off.

When it is time to land, you will find that the Ultimate is a bit cleaner than other biplanes and doesn't lose a lot of airspeed during the approach. I held just under 1/4 throttle on final approach and kept the nose level until the model was at the end of the runway. I then cut the engine to idle and slowly pulled back on the stick to flare the model. You'll find this Ultimate very well behaved.



• SLOW-SPEED PERFORMANCE

The model is very predictable, and if you rig the wings correctly, it doesn't show any signs of tip-stalling. With the throttle reduced and the model trimmed for slow speed, all the controls remain responsive and firm. Roll control (four ailerons remember) remains the most responsive, while elevator feels just a bit softer. Rudder remains adequate and easily compensates for crosswind landings. When pulled into a stall, the model wallows just a bit, and then (if the wings are level), it breaks straight ahead. Recovery is immediate when you neutralize the elevator and apply some power.

• HIGH-SPEED PERFORMANCE

The Ultimate is a real powerhouse, and it can really get up a good head of steam. With the increase in airspeed, control authority firms up but not to the point where I would call it uncomfortable. As with any high-performance model, if you yank at the controls, you can cause the model to enter a high-speed stall. Flying the model smoothly is the best way to look good and stay out of trouble.

• AEROBATICS

The Ultimate was designed with aerobatics in mind, and there is nothing that I can think of that the model cannot do. I first tried knife-edge flight and was surprised how little rudder is needed to maintain altitude. Also, very little, if any, coupling (roll or pitch) is evident. There is plenty of rudder authority for performing knife-edge loops. Even on the backside of the maneuver, when the model heads straight toward the ground, you have complete control.

Snap rolls require more aileron and less elevator input. The first few times I executed a snap roll, I had high rates on all controls and the model overreacted—I did two, when I only wanted to do one. When I lowered the elevator rate, the snaps really started to look better. With a little practice, you can easily do one, one and a half or two snaps and exit straight and level.

Inverted flight is very easy and requires almost no down-elevator to maintain altitude. I added a little down-trim, and then I could fly inverted, hands off, at least for a short while.

If you like doing wingovers and hammerheads, this model is a joy to fly. Vertical lines are easy, and the rudder yaws the model over beautifully. I did push in a little down stick while in the down line to keep it vertical.

The DPM Ultimate ARF is an excellent aerobatic performer that makes the average pilot look good and the good pilot look even better. The model's name really does say it all.

alignment procedure are clear and easy to understand.

ENGINE INSTALLATION

Engine installation is a little different with this model, as its engine cowl comes already screwed into place. Because of this, you have to be very careful and precise when you position the engine and its mount on

the firewall. If you do it correctly, the prop and spinner will align properly with the cowl when you've finished. Mine was off about 1/8 inch. I used an Enya 1.20R for power, and I used the supplied glass-filled, plastic engine mount. Here again, the procedure is clearly described in the instructions, so be sure to follow them. The firewall is already coated with epoxy to fuelproof it.

DIGITAL HOLDING POWER

I have been using a JR radio and servos for a very long time, and up until now, my favorite all-around servo for aerobatic flying has been the 90 oz.-in. torque NES 4131 servo. After flying the Ultimate with the new NES 8231 digital servos, I have found my newest favorite servo. Though its torque rating is about the same as the 4131's, the 8231's digital amplifier gives it about five times the "holding power." This means that there's no drift in servo-arm position. The new digital servos do consume slightly more current than older servos, but you can easily compensate for this by using a larger battery pack.

After several flights, I noticed that servo centering is always dead on. Entry and exit of snap rolls are almost instantaneous and very precise and consistent. You can really feel the difference. Even if I don't switch over completely to digital servos, I will upgrade my models by using them on elevator and aileron control.

Because of the position of the engine's carb and throttle arm, I had to install an off-set throttle linkage to connect the throttle cable to the carb. I cut one arm off of a 90-degree bellcrank and screwed it to one of the engine-mounting beams. I then attached two Du-Bro Kwik-connectors to the bellcrank (one on the outboard and one on the inboard side of the bellcrank arm). I also installed a Kwik-connector on the throttle arm. I then installed the throttle cable and attached it to the outer connector on the bellcrank. To connect the inner bell-

Right: a great engine for the Ultimate ARF is the Enya 1.20R 4-stroke. Turning a 15x6 prop, the engine gives the biplane excellent vertical performance. Below: the aileron servo hatches come already covered and fitted into place. The strings taped to the inside of the wing help feed the servo leads through the ribs—a nice touch.



JR CONTROL

The PCM 10X is a powerful and versatile radio that's perfectly suited for precision aerobatic flying. Its most obvious feature is the easy-to-use touch-screen control panel that allows you to easily navigate and adjust all of its features. I especially like the 10X because it has digital trims on aileron, rudder and elevator but not on throttle. The mechanical trim on the throttle is very helpful in managing your engine during starting and while shutting it down. It also feels more natural than digital trims do during a landing approach when you want to be sure where your throttle trim is set. A digital-trim equipped throttle prevents you from simply looking at or feeling the trim lever's position as you set up for landing.



crank connector to the carb, I used a short length of 1/16-inch welding rod that I bent into a Z shape. This setup provides very smooth throttle operation and eliminates any sharp bends in the throttle cable.

Once the engine and throttle linkage were in place, I installed the fuel tank and the fuel lines. To complete the fuel system, I used a three-line fuel tank setup and a large Du-Bro Kwik-fill fitting that I installed in the lower fuselage hatch just behind and below the firewall. I then cut the openings in the engine cowl for the needle valve, the valve cover and the exhaust pipe and muffler.

FINAL ASSEMBLY

All that is left is to finish the radio installation and attach the wings. I used a JR 10X and new NES DS8231 digital servos for all the control surfaces and an NES 531 for the throttle. The Y-harness for the upper aileron servos passes through the fuselage sheeting, and I taped its connectors to the forward cabane struts. This gives the model a neat appearance and prevents the leads from pulling apart. I connected the upper ailerons to the Aux. 2 channel and slaved it to the aileron channel.

To compensate for the higher current draw of the digital servos, I used an 1800mAh battery pack. I installed it just behind the firewall next to the fuel tank. The bottom wing uses two nylon bolts and a plywood alignment tab to hold it in place in the wing saddle, while two machine screws and locknuts hold the top wing to the cabane struts. Once you install the interplane struts and secure them to the attachment fittings with 4-40 cap-head screws, the wing installation becomes very rigid.

I finished the model by installing a 1/4-scale pilot figure from Nelson Hobby

Specialties. So the pilot figure had something to look at, I also made a makeshift instrument panel and glued it into place.

CONTROL THROWS

For the first time out, I set up the control throws using the values recommended in the instructions. For high-rate control, I used 3/4 inch up and down on the ailerons, 2 1/2 inches up and down for the elevators and 3 inches left and right for the rudder. Low rates were 1/4 inch less up and down for aileron, 1 inch less up and down for elevator and 1 inch less left and right for rudder. I also used 60-percent exponential on aileron, rudder and elevator. Make sure you have 1.5 degrees of positive incidence on the horizontal stab, 2 degrees of right engine thrust and zero degrees of wing incidence on both wings.

The balance point for the model's CG is between 1/2 and 1 1/2 inch in front of the aft cabane strut. After several flights, I found that the aftmost position was best for my style of flying. Start at the front position for your first flight, and slowly move the CG back until you achieve the response and feel you are comfortable with.

I am extremely pleased with the Dave Patrick Models Ultimate ARF. It was very easy to assemble, and even better, it is a delight to fly. With the Enya 1.20R engine, the model can do every maneuver in the book, and my only limitation is that of my own flying skills. If you want to get into IMAC competition or just want a big, beautiful aerobatic biplane to fool around with on weekends, you'll be pleased with it, too! ✈

Altech Marketing, P.O. Box 7182, Edison, NJ 08818-7182; (732) 225-6144; fax (732) 225-0091; www.modelrec.com.

Anchor Bond; distributed by Anchor Seal, 16 Riverside Ave., Danvers, MA 01923-3281; (978) 774-5217; fax (978) 774-0638; www.anchorseal.com.

Dave Patrick Models, 1811 E. 400 North Rd., Milford, IL 60953; (815) 457-3128; fax (815) 457-2938; www.davepatrickmodels.com.

Enya; distributed by Altech Marketing, P.O. Box 7182, Edison, NJ 08818-7182.

JR, 4105 Fieldstone Rd., Champaign, IL 61822; (217) 355-9511; www.horizonhobby.com.

Nelson Hobby Specialties, 394 S.W. 211th Ave., Aloha, OR 97006; toll-free (877) 263-5766; (503) 259-8899; www.nelsonhobby.com.

.20-size sport-scale classic



GREAT PLANES

T-Craft

by Randy Randolph

SPECIFICATIONS

Model: T-Craft

Manufacturer: Great Planes

Wingspan: 56 in.

Wing area: 497 sq. in.

Weight: 3 lb., 10 oz.

Wing loading: 16.5 oz./sq. ft.

Length: 40.75 in.

Engine req'd: .20 to .32 2-stroke;
.26 to .30 4-stroke

Engine used: O.S. .25LA

Radio req'd: 4- to 5-channel with 5 S-33 servos

Price: \$89.99

Hits

- Well designed and engineered.
- Excellent plans and instruction manual.
- Nice die-cut parts.
- Complete hardware package.

Misses

- Difficult plastic-cowl and wheel-pant assembly.
- Weak landing-gear fairing mounts.



Assembling a good kit is an excellent way to develop model-building skills. A lot of the pure drudgery has been eliminated from modern kits, but the pleasure of creating something with your own hands remains. The Great Planes T-Craft kit is no exception.

The T-Craft is a .20-size scale airplane that needs a fair amount of work. Almost anyone who can read and use basic hand tools, and who has built a few sport kits, should do a good job.

When I first opened the kit, I saw the formed, three-piece cowl, the wheel pants and the instruction manual. Neatly bundled sticks of wood lie below the manual, followed by stacks of die-cut parts. A clear plastic bag contains the hardware and all of the smaller parts. An engine mount is also included. I chose to use an O.S. .25LA engine to power the T-Craft and am pleased with the results.

The die-cutting is well done, and the parts require only minor trimming for a perfect fit. The tail surfaces are built up rather than solid. Once I had assembled them, I sanded them on both sides. I used masking tape to hold the movable surfaces to the fixed ones when rounding the edges.

After sanding, I joined the elevators to the wing halves with the provided $\frac{3}{32}$ -inch wire. I then separated them by trimming through the leading edge (LE) spar. After a final sanding, they were ready to be hinged.

First, I laminated the two spruce main spars so that they were thicker at the root than at the tip. Then I notched the bottom spars where they bend up slightly to form the tip. Both wing halves can be built at the same time if the building board is large enough, but it's better to build one at a time so that you become familiar with the procedure.

I pinned the bottom main spar over the plan with $\frac{1}{16}$ -inch spacers. I added the ribs, followed by the wing's trailing edge (TE) and the top main spar. Each of the ribs has removable flanges on the bottom to hold it in place on the plan. This is an old system that works well on

anything other than a flat-bottomed wing.

Next, I added the aileron cutout spar, followed by the aileron's TE. The sub-LE, all spars and their webs, as well as the top of the aileron TE must be completed before the wing is removed from the plan.

Join the wing halves with plywood dihedral braces. The provided dihedral jig raises one wingtip the proper amount, while the other is flat on the bench. One of the center ribs on my plane was brittle, and the bottom LE split every time I slipped a dihedral brace halfway through. After repairing these breaks, I began sheeting the LEs and center section. The kit provided just the right weight of "A" grain, $\frac{1}{16}$ -inch sheet to make this very easy.

The ailerons are assembled next. I glued the die-cut backbone to the $\frac{1}{4}$ -inch-thick spar and added the ribs to both sides. Instead of using the supplied rectangular pieces of balsa that needed to be sanded to shape, I sliced them diagonally and used the long triangles as ribs. They still needed sanding to fair the ailerons smoothly into the wing, but not as much. Actually, quite a bit of sanding and shaping is needed to get the wings to the covering stage, but they look good when they are ready.

Each aileron has its own servo, and the mount is installed in the wing. I drilled the die-cut plywood servo mounts before I installed them. Before you cover the wing, install the servos and connect them to a Y-harness that extends through the wing's center section and into the cabin area.

FLIGHT PERFORMANCE



The wide landing gear and generous wheels provided solid ground control, and the takeoff was straight with very little correction. The wing struts were in place for the first test flights of the T-Craft. The airplane flew well with the struts, but control response was slow. At full power, this was not a real problem, but as with its full-scale prototype, coordinated rudder was necessary for smooth turns. At $\frac{1}{2}$ throttle, the O.S. .25LA produced gentle, slow flight with no tendency to stall.

Once I removed the struts, the T-Craft became another airplane! Control response was crisp, and much less rudder was required for smooth, coordinated turns. Furthermore, less than $\frac{1}{3}$ throttle kept it in the air. Landings improved with a nice smooth approach and an easy hold-off to nice 3-pointers!

• AEROBATICS

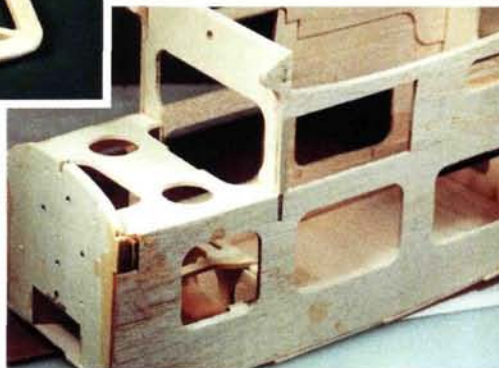
With control throws set at maximum, the T-Craft has all the moves of an advanced trainer. Loops and rolls, stall turns, wingovers, snaps, spins and inverted flight are easy and done with style. Though not a true aerobat, the T-Craft is capable of just about anything you want it to do.



Left: the elevator and rudder are built up, and this removes a lot of weight from the tail surfaces and makes the airplane easier to balance. Below: the fuselage sides are built from die-cut ply and balsa parts. The sides are joined with die-cut formers. Fore and aft turtle decks ensure a straight fuselage.

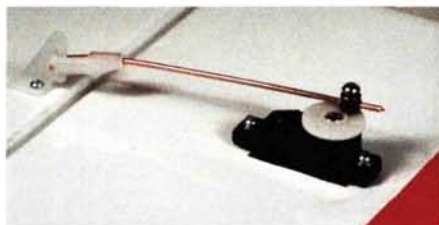


The aileron servo mounts are built up from die-cut ply parts. I installed extensions for each servo before covering the wing. Masking tape holds the end of the extension in place so it can be located after the wing is covered.



tions did not clearly identify the proper places to trim; I trimmed for over an hour before I found the right "embossed" lines and was able to properly fit the pieces together for gluing. Because the cowl must be removed to refuel, you may want to add a refueling device.

Before you cover the wing, make a small hole in the bottom of the wing's center sheeting to allow the servo leads to exit. I installed the wiring before I covered the wing and used masking tape to anchor each lead below the servo mounts.



Above: the externally mounted aileron servos under the wing make aileron adjustment easy. All of the hardware is included. Right: following the instructions, I attached the landing-gear fairings with strips of rubber bands glued into place.

short pieces of rubber band. This worked fine for a while, but on the second flight, one fairing came loose, and the other almost separated. I glued them back but later added strips of MonoKote to hold the landing-gear legs to the fairings and heavy-duty strapping tape to hold them to the fuselage bottom.

FINAL SETUP

To control the T-Craft, I chose to use five Futaba S-33 servos, two of which I mounted in the wing for aileron control. The receiver is an FMA Direct Fortress, which I powered with a 600mAh battery pack. Everything fit nicely, and for such a short-nosed airplane, the T-Craft balanced perfectly.

CONCLUSION

This is a well-engineered kit. The plans and the instructions are great, and using a small-scale plan as the centerfold is a very nice touch. This is not the easiest kit to build because there is more to it than a square box trainer, but it is not exactly difficult, either! There is plenty of room for the fuel tank and radio, and it's easy to adjust the external ailerons to achieve the correct trim.

Since I do not normally build scale models, I have no idea how close to scale the finished product really is, but it looks a lot like the only T-Craft I ever flew. That was 45 years ago! ✚



The fuselage sides are built right on the plan. One of the sheets that contained part of the fuselage was accidentally left out of my kit, but a call to Great Planes' customer service brought the part within the week.

While I was waiting, I built one half of the fuselage and completed the laminating of bulkheads. When the two sides have been built, the fuselage can be assembled like a jigsaw puzzle with large pieces.

Die-cut fore and aft decks ensure that the tail surfaces are true when they're attached. A couple of the plywood bulkheads were slightly warped, but the notches in the fuselage side seemed to correct this.

Installing the engine and motor mount is very easy and is clearly explained in the instructions. To make the installation easier, you should install the engine, fuel tank and throttle linkage before adding the top and bottom sheeting. After the bottom and forward sections of the turtle deck have been sheeted and the 1/8-inch hardwood dowel stringers have been added, you should test-fit the windshield.

I cut out the preformed windshield along the lines as instructed, and it fit perfectly without any trimming or adjustments. I then put it aside until I was ready to complete the covering and final assembly.

The cowl comes in three pieces that must be cemented together. The instruc-

I used the MonoKote covering recommended by the manual and tried to match the red and white color scheme on the box. I also used MonoKote on the plastic parts because I had no matching paint—and it worked! There was just enough heat to anchor the MonoKote.

Because I top-hinged the ailerons, I had to relieve the bottom (LE) of the aileron spar to allow for downward movement. The aileron hinge system was the only change I made to the plane.

Following the instructions, I attached the landing-gear fairings to the legs with

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WattAge **Hawk**

Impressive performance at an affordable price

by John Tracey

If you're looking for an inexpensive, small, sport model that's intended for light aerobatics and thermal soaring, then the folks at WattAge have the answer. The Hawk is a low-cost, high-performance glider that comes with a direct-drive, Speed 380 electric motor, prop and spinner, and its sleek, smooth shape penetrates the air with little resistance. An aileron conversion kit is available, but it's definitely not needed for good performance. The plane's compact size not only means that the Hawk takes up less room in the car, but it can also be flown in smaller fields.

CONSTRUCTION

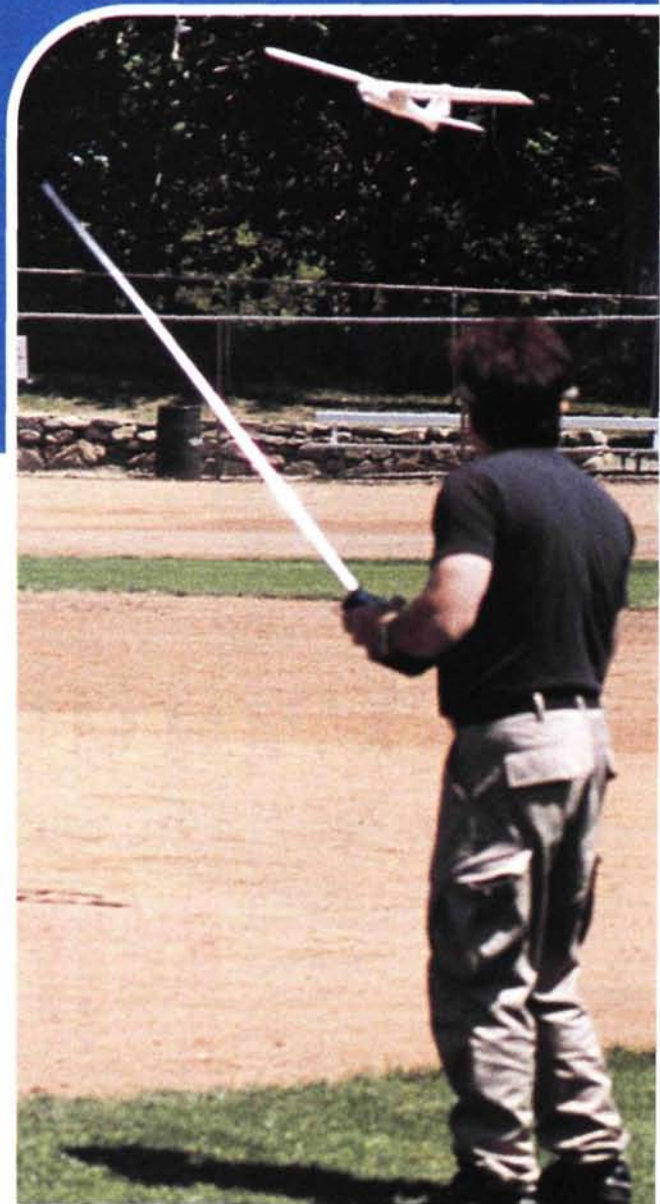
More and more planes are on the market that can be in the air within only a few hours of opening the box, and the Hawk definitely fits into this category. I began to put it together right after dinner, and it was ready to go in no time.

The assembly of this foam and plastic glider was very simple. The first step is to assemble the wings. They consist of an EPS foam core encased in closed-cell sheet foam and are constructed by epoxying the halves together. For extra strength and support, a sheet of thin plastic is attached on top of the wing with adhesive. This may not seem like enough to keep the wing together, but it is. I put this plane through the wringer, and the wing kept up with everything.

The fuselage is made from a blown plastic mold. I used a razor knife to cut out the holes under the wing saddle and canopy for the electronics and motor. In the front of the fuselage, there is a spot for a small hole that lets air in to cool the motor and ESC. The instructions call for this to be cut out, which I did, but I recommend that you do so only if needed. The problem is that when the glider lands on dirt, the hole allows dirt to enter the fuselage; I found myself constantly shaking it out. Landing on a grass field would keep it clean.

The tail feathers are made of the same lightweight EPS foam and closed-cell sheet foam as the wing. To make life easy, they come prehinged, but

Below: Chris Chianelli flies the Hawk in a ball field outside the Model Airplane News offices.



SPECIFICATIONS

Model: Hawk Micro Glider EP

Type: park flyer

Manufacturer: WattAge

Distributor: Global Hobby Distributors

Wingspan: 30 in.

Length: 24.5 in.

Wing area: 154 sq. in.

Weight: 11.5 oz.

Wing loading: 10.25 to 11.25 oz./sq. ft.

Motor: direct-drive Speed 380 (included)

Batteries: 6- or 8-cell 650mAh NiMH

Prop: 5x2.5 (included)

Radio req'd: 3-channel

Radio used: Futaba 6XA transmitter with a JR 6-channel micro receiver, two Cirrus C-20 microsensors and a WattAge IC-15 speed control

Price: \$59.99

Features: includes a direct-drive Speed 380 motor, a propeller and propeller adapter, threaded wire pushrods with clevises, control horns and colorful decals; features a blow-molded fuselage, molded foam wing panels and molded foam flying surfaces to make up a lightweight and durable model; combo package that includes a battery and ESC is also available for \$89.97.

Comments: the WattAge Hawk is a fun plane to fly; its light weight combined with the direct-drive Speed 380 motor really help it take off.

HITS

- Excellent flight performance.
- Short building time.
- Great value.
- Compact design.

MISSES

- Air-scoop location allows dirt to enter fuselage.

the hinges must be bent back and forth a few times to break them in.

Both the stabilizer and the tail fin are held in place with small wood screws. I thought it would be easier to epoxy them into place, but I followed the instructions



A close-up of the Hawk's radio box. The Speed 380 motor and 8-cell, 650mAh NiMH battery pack easily provide more than enough power for 10-minute flights.

instead, and the screws worked like a charm. If you're also tempted to use epoxy on the stabilizer and tail fin, don't do it! It would be faster, but there are disadvantages. If you land hard on the nose and need to replace the fuselage, the epoxy makes it difficult to remove the tail feathers. In addition, the screws are actually stronger than the epoxy; in extreme crashes, they will flex a bit, but epoxy may crack.

I inserted two Cirrus C-20 servos into a small plastic frame that is held in the fuselage with a self-adhesive backing. They fit perfectly. Both of the control horns were a pleasure to install; WattAge's unique design uses a snap fit to hold them firmly in place. The pushrods snap into the control horns with a clip arrangement.

An aluminum plate sandwiched between the fuselage and the Speed 380 motor holds the motor in the nose. I made the hole in the nose of the fuselage a little larger than instructed, and this gave me a fair amount of room to center the motor.

WattAge recommends that you power the motor with one of its new 650 NiMH battery packs that comes with either 6 or 8 cells. The 6-cell pack is suitable for slower flying with less power and a lighter wing load; the 8-cell pack is perfect for faster, more aerobatic flight. The 8-cell pack is my favorite, but using 6 cells in the Hawk makes it only slightly tamer.

I mounted the prop and spinner on the included adapter. The prop's pitch is only 2.5 inches, and with such a low pitch, I thought the model might be a little underpowered. I was wrong!



The Hawk's control horns were easy to install and the unique snap fit holds them firmly in place.

I cut out the clear canopy with regular kitchen scissors. I usually cut out vacuum-formed parts at least twice; I start by cutting ¼ inch from the line and then gradually cut in closer from there. I taped the canopy into place on the fuselage and drilled holes for the screws. If you don't already have a no. 0 Phillips-head screwdriver, get one. It is a necessity when working with small airplanes.

CONCLUSION

The WattAge Hawk is a great bang for the buck. It's not often that I come upon a plane in which the performance far exceeds the price. If you have some flight experience and are looking for a compact electric plane that flies fast and is capable of aerobatics, this may be just what you are looking for. Because it's so small, I keep mine in the car at all times; this ensures that no potential flying opportunity will pass me by. ✚

Cirrus Ventures, 115 Hunter Ave., Fanwood, NJ 07023-1030; (908) 322-7221.

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WattAge; distributed by Global Hobby Distributors, 18480 Bandilier Cir., Fountain Valley, CA 92728-8610; (714) 964-0827; fax (714) 962-6452; www.globalhobby.com.

FLIGHT PERFORMANCE



I made the first flight with the 8-cell pack. After I threw the Hawk into the air, it took a few seconds to pick up speed and then took off like a rocket. The climb rate was much better

than I expected, and the control response was high.

I set my dual rate to low and trimmed it for straight flight. After a few minutes in the air, I was ready to get a little crazy and see what it could do. This plane is a lot of fun; you can really wring it out!

I think the model's best aerobatic maneuver is the snap roll. I like

to dive a little to pick up extra speed then shoot straight up while doing three or four consecutive rolls. Split-S's and even Cuban 8's are totally within its capabilities. With two or more Hawks you could have some awesome soccer-field pylon racing. The Hawk is fast! This plane is going to stay on top of my "most enjoyable park flyer" list for a while.

The Hawk was not designed to go slowly but it can easily be flown in small, open parks. Be careful on your landing approach; if you don't keep the speed up, it could stall at a low altitude. Some of my roughest landings occurred when I overshot my mark and tried to pull it a bit closer by giving it more throttle. The model lands most smoothly when it just glides in.

Onboard GLOW- DRIVER Guide

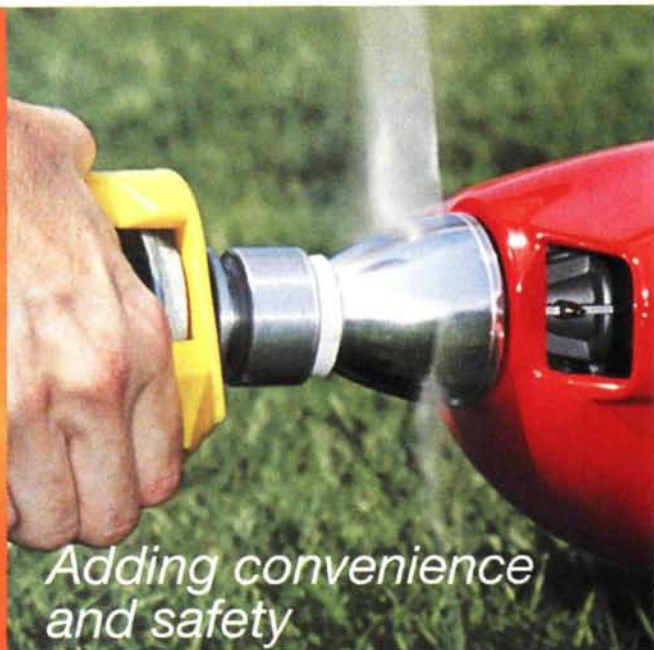
by Jaime Lagor & Gerry Yarrish

It's no secret that we often have difficulty accessing the glow plug to start our engines. In scale models, the engine might be tightly cowled or covered by a dummy scale engine, so connecting the glow-driver lead is a problem. Multi-cylinder engines have two or more glow plugs, so easy glow-plug access is even more essential; and in 4-stroke engines with overhead valves, getting power to the glow plug is a real challenge.

Many of us have discovered that we can attach a glow-plug-driver extension lead to the plug and use a remote receptacle to ease the task, but the ultimate setup is an onboard, self-contained glow driver, and this guide shows many of them and tells how to install and use them. They make starting even the most difficult-to-reach engines a snap, and they make the procedure safer.

An onboard glow-driver unit requires a control box, a rechargeable battery and a charging jack, an on/off switch, wire leads and a glow-plug cap or connector. Some are simply a large-capacity battery and an on/off switch; others are sophisticated, microprocessor-controlled devices that serve other functions in addition to delivering power to the glow-plug element.

Regardless of complexity, however, they all help ensure safe engine starting and reliable performance. Being able to energize the glow plug when the engine is at a low idle (when it is coming in for a landing, for example) greatly decreases the likelihood that the engine will quit when you might need it most—for a go-around or to stretch a short approach. So if these are some of your most annoying problems, suffer no more!



Adding convenience and safety



From Horizon Hobby, the Expert Electronics Onboard Digital Glow Driver has easy one-touch setup and an automatic on/off feature controlled by a receiver signal. The unit can use a 1-, 4-, or 5-cell battery pack for power and is twin-cylinder compatible. Soldering isn't required, and the unit is reverse-polarity protected (\$59.95).

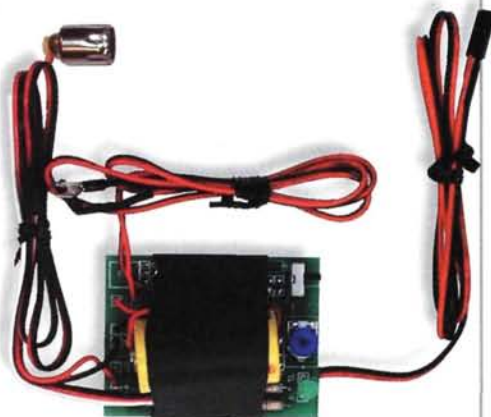
The Intelligent Glow Driver from Nelson Hobby Specialties is unique in that it works independently of the throttle servo. Its circuitry measures the glow plug's temperature and adjusts the current 60 times per second to keep the plug going only when it cools off. This extends battery life and improves engine reliability (\$49.95).



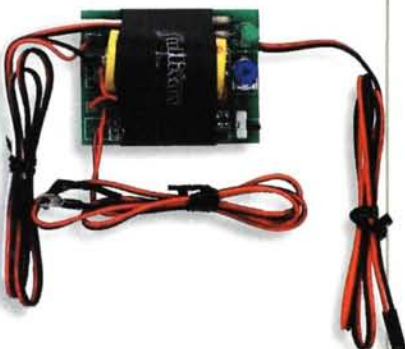
The EDR-103 and -103M GlowLite drivers from ElectroDynamics are wired to suit all brands of radio systems and can be used for single- or twin-cylinder engines (no. 103—\$39.95) and for multi-cylinder engines (103M—\$79.95).



The single (no. M046—\$109.95) and twin (M047—\$119.95) glow drivers from Model Products Corp. feature easy setup and operation. The fully adjustable on/off position, LED indicator and servo-reversing switch make installation a breeze.



Sullivan's electronic glow-plug driver (\$76.59) can be used to drive one or two glow plugs; it has a fully adjustable on/off position, a reversing switch and an LED indicator that make setup easy.



The microprocessor-controlled MX-9900 Super Glow from Maxx Products Intl. has three operating modes: dual, automatic and manual. It's compatible with AM, FM and PCM radios and has automatic shut-off (\$45.95).



DYMOND MODELSPORT USA

Glow 4

\$49

Automatic operation up to 4 cylinders; variable pre-selectable power; two-way RC activation; 60 minutes of glow time per cylinder with 1800mAh Ni-Cd.

ELECTRODYNAMICS

EDR-103 GlowLite

\$39.95

For single and twin cylinders; comes wired with RC system connector of your choice and remote LED indicator; accessory packs are available (single—\$20, twin—\$40).

EDR-103M GlowLite

\$79.75

For 3- to 5-cylinder engines; has the same features as the 103 plus HD glow-plug circuit connectors and fuse-lage-mounted Deans charging jack; 7-cylinder model—\$94.95.

EMS JOMAR ELECTRONIC ACCESSORIES

Glow Driver

\$44.95

Opto-isolated glow-driver switch uses a high performance MOSFET; "On" point is easy to adjust; can drive more than one glow plug; servo-reversing is selectable with a header jumper; includes glow-plug wire and connector and servo connector to receiver.

EXPERT ELECTRONICS

Onboard Digital Glow Driver

\$59.95

Programmable to power the glow plug when the throttle is reduced below a preset position; compatible with radios of all types and brands; twin-cylinder compatibility; universal connectors that fit JR, Futaba, Airtronics and Hitec.

JHM AERO ENGINEERING

DGS 2 Glow Driver

\$29

Powers one or two glow plugs; compatible with any receiver; works with 1.2V C- or D-cell; has throttle-direction-reversal switch; available in packages that include everything needed for installation (\$71 to \$79).

DGS 5 Glow Driver

\$49

Powers up to five glow plugs; includes all the features of DGS 2; packages available for \$118 to \$130.

MAXX PRODUCTS INTL.

MX-9900 Super Glow

\$45.95

Full digital design; one-button idle setup; three modes of operation: dual, automatic and manual; external LED indicator; suitable for singles or twins; compatible with all systems; Deluxe Kit (\$69.95) includes wire harness, glow-plug connector, switch, battery charger and a Sanyo N-1900SCR cell.

MCDANIEL R/C

Onboard Glow-Power Systems

\$88.45 to \$303.45

McDaniel offers 15 glow-power systems for engines ranging from 1 to 18 cylinders; all are fully compatible with any radio system and all have automatic shutdown.

MODEL PRODUCTS CORP.

M046 Electric Single Glow-Plug Driver

\$109.95

Has similar features to the Sullivan model listed above, but it also includes a Head Lock Remote head. Distributed by Sullivan Products.

M047 Electric Twin Glow-Plug Driver

\$119.95

Same as M046 model, but is wired with two Head Lock Remote heads.

NELSON HOBBY SPECIALTIES

Intelligent Glow Driver

\$49.95

Unit operates independently of throttle channel; senses the temperature (resistance) of the plug's coil 60 times per second; weighs 1.5 ounces and acts as a receiver-battery-voltage sensor; includes LED indicator.

PRECISION MICRO ELECTRONICS

GD210A Glow Driver

\$34.95

Automatically turns off when transmitter is off; low power consumption; compatible with AM, FM and PCM radios; includes hook-up wire; selectable on and off points (with connector—\$37.90; with connector and plug—\$44.85).

GD211A Glow Driver for Multi-Cylinders

\$40.95

Features all of the above (\$43.80 with radio connector).

SULLIVAN PRODUCTS

S672 Electronic Glow Plug Driver

\$76.59

Fully adjustable "on" point so the plug will receive power at any chosen setting; includes a reversing switch and LED indicator to help with setup; plugs into a Y-harness with the throttle servo.

The Precision Micro Electronics single GD210A and GD211A (multi) drivers make engine starting safe and easy. These units have low power consumption and are compatible with all radio types. The units come with hook-up wires, but you supply the battery, plug clip and radio connectors. Completely wired single-and multi-cylinder systems are available on request (GD210A—\$34.95), GD211A—\$40.95.



JHM Aero Engineering's DGS 2 Glow Driver powers one or two glow plugs; compatible with any receiver; works with 1.2V battery; has throttle-direction-reversal switch \$29; available in packages that include everything needed for installation.



Longtime onboard glow-driver manufacturer McDaniel R/C Electronics offers several compact glow-driver units for single, twin and multi-cylinder engines of up to 18 cylinders. Fully adjustable for "on" position, all come in a protective case and have an LED indicator, a charging jack, an on/off switch and a PlugLock glow plug cap: Single (no. 466—\$93.45), Twin (472—\$103.45), 5-cylinder (475—\$143.45).

INSTALLATION

There are two ways to install an onboard glow-driver unit:

- Connect it to the throttle channel with a Y-harness. With this arrangement, you use the unit's own adjustment potentiometer to set the glow plug's on/off positions relative to the throttle-stick position.

- Attach it to an auxiliary channel and slave it to the throttle channel with the radio's programmable-mix function. This allows you to adjust the actuation position in the mix program itself. It is important to adjust your unit so that it supplies power to the plug only when it is needed. If you adjust it so that it supplies power for longer than is

necessary, you'll have to recharge your battery more than you probably want to. A good operating range is from low idle to just under $\frac{1}{4}$ throttle.

Several of the available units have a light or an LED to indicate whether or not the unit has been activated. The indicator should be readily visible so that you'll know whether your engine is ready to start. Many modelers with scale airplanes install it in the cockpit so that when they're starting their engines, their assistants can easily see it. Likewise, the driver's on/off switch and charging jack should be clearly labeled and easy to reach. †

Dymond Modelsport USA Ltd., 683 N. Main St., Oshkosh, WI 54901; (888) 4FUN FLY; (920) 303-1100; fax (920) 303-2021; www.rc-dymond.com.

ElectroDynamics, 31091 Schoolcraft Rd., Livonia, MI 48150; (734) 422-5420; fax (734) 422-5338; www.electrodynam.com.
EMS/Jomar, 22605 E. LaPalma Ave., Ste. 516, Yorba Linda, CA 92887; (714) 692-1393; fax (714) 692-1330; www.emsjomar.com.

Expert Electronics; distributed by Horizon Hobby Inc.

Horizon Hobby Inc., 4105 Fieldstone Rd., Champaign, IL 61822; (217) 355-9511; www.horizonhobby.com.

JHM Aero Engineering, 123 Radford Cir., Marietta, GA 30060; (770) 438-7146; www.jhmaeroengineering.com.

Maxx Products, 815 Oakwood Rd., Unit D, Lake Zurich, IL 60047; (847) 438-2233; fax (847) 438-2898; www.maxxprod.com.

McDaniel R/C, 13009-B Vine Ct., Russellville, MO 65074; (573) 782-6689; (573) 782-6691; www.mcdanielrc.com.

Model Products Corp.; distributed by Sullivan Products.
Nelson Hobby Specialties, 394 S.W. 211th Ave., Aloha, OR 97006; toll-free (877) 263-5766; (503) 259-8899; www.nelsonhobby.com.

Precision Micro Electronics, P.O. Box 3129, Corpus Christi, TX 78463; (361) 814-6843; fax (361) 814-5843; pmetek@swbell.net.

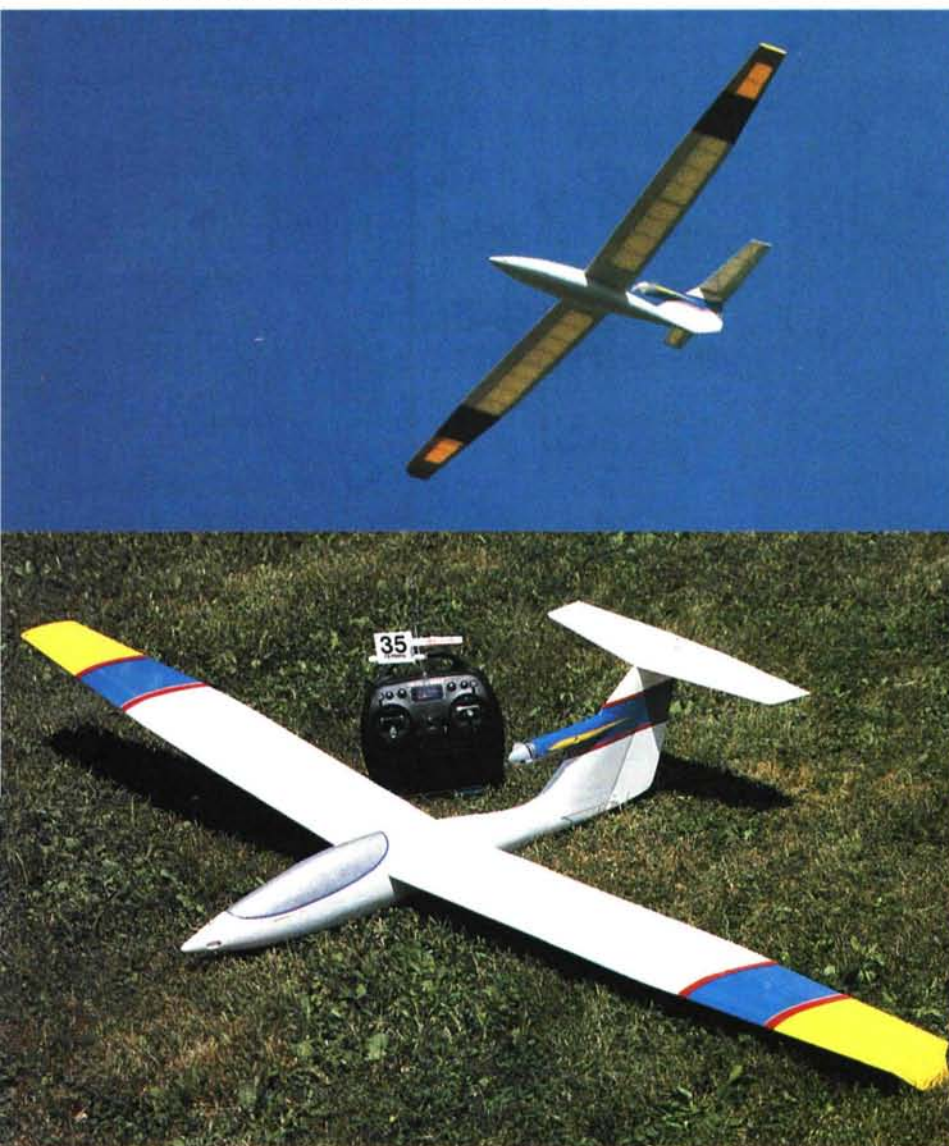
Sullivan Products, One North Haven St., Baltimore, MD 21224; (410) 732-3500; fax (410) 327-7443; www.sullivanproducts.com.

*A sleek
Speed 400-powered
glider*

by Nick Zirolì Sr.

WINDEX 1200C

Known as "the world's fastest self-launching sailplane," the Windex 1200C is a very attractive, powered, aerobatic sailplane. Its 24hp engine is mounted on the fin. I learned about this aircraft when aerobatic champ Steve Coan published an article about it in the June 1998 issue of *Sport Aerobatics* magazine. Steve has won many aerobatic sailplane and powered aircraft awards, and he flies the Windex at airshows. Another article about the development of the Windex appeared in the August 1994 issue of *Sport Aviation*. With a wingspan of just under 40 feet, the Windex has a cruise speed of 124mph; sounds like a pretty efficient sailplane to me.



Nick's Windex awaits its first flight. Nick chose an Airtronics Infinity radio for control.



Nick poses with his well-flown Windex. Several years old, the model performs well with a Speed 400 motor.



SPECIFICATIONS

Model: Windex 1200C

Type: semi-scale electric powered glider

Wingspan: 72 in.

Wing area: 395 sq. in.

Weight: 22 to 25 oz.

Wing loading: 9 oz./sq. ft.

Length: 34 in.

Motor: 6V Speed 400, 7.2V 500AR battery

Speed control: BEC with brake

Radio req'd: 3- or 4-channel (rudder, elevator, speed control; aileron optional)

Comments: designed by Nick Zirolli, the Windex is a sleek, sport-scale model of an aerobatic motor glider that uses traditional balsa and ply construction and a planked fuselage. The Speed 400 motor is mounted in a nacelle attached to the vertical fin. The plan shows details for optional aileron control.



When I got the urge to build something powered by a Speed 400 electric motor, the Windex immediately came to mind. I called Tom Hunt at Modelair-Tech, and he suggested a 6V motor using 7 Sanyo 500AR cells to power a 400-square-inch glider. The only major change in the planform is a reduction of the wing's aspect ratio.

I originally designed the model for rudder, elevator and speed control, and it flew perfectly well in calm weather. In a strong crosswind, however, the rudder sometimes became rather sluggish. I increased the wing's dihedral to improve control, and I feel that ailerons would eliminate this problem and also make the model more aerobatic. I have included aileron details on the plan. After three years of flying—and occasionally, repairing—my model, it weighs 23½ ounces, ready to fly.

CONSTRUCTION

If you like building models, you'll enjoy constructing the Windex fuselage. Even if you aren't an expert builder, give it a try; it isn't as difficult as it appears. I built two complete fuselages—one for a Speed 400 motor and one for a ½A glow engine.

Cut the fuselage sides and D-1 doublers from soft ¾-inch sheet balsa. Don't use stiff, quarter-sawn wood; it won't work. Use the stiffer wood for ribs, formers and control surfaces. Cut out the formers, and be sure to put the ¾x¼-inch cross-braces on them where shown. Join the fuselage sides at the tail and F-5, but don't glue the tail ends together; for now, pin or clamp them with an ¼-inch spacer. The ¼-inch-square tail post will be added later as part of the fin. Dampen the outer sides with water to help shape them around the formers. Glue formers F-6, F-7 and F-8 into place. Add the remaining formers one at a time while working toward the nose. Be careful not to build a curve or twist into the fuselage. Install the keel piece FK-1 and cover the bottom with ¾x¼-inch

balsa strips. Work from each side to the bottom middle. It is best to cut your own strips from the same sheet of ¾-inch balsa. Not only is this much cheaper, but it also ensures the same wood density all over and makes it easier to sand the surface. I use thin Zap for strip planking, and I apply it on the inside wherever possible. This keeps most of the excess glue on the inside, making sanding much easier. Use a block and new 100-grit sandpaper and then progressively finer sandpaper to shape and smooth the finish.

Clamp the full-length tail post into place, and with a straight-edge placed across the wing saddle, make sure it is square to the fuselage. If it isn't, twist the aft end of the fuselage and hold it in place by adding ¼-inch-square diagonal braces at the top of the sides between formers F-6, F-7 and F-8. Glue the top cutout piece from F-6 to former F-6A, and then tack-glue F-6A into place. It will become part of the hatch, so make sure you can remove it.

Install the rudder and elevator servos as shown on the plan, and install the pushrod tubes so they align with them. The elevator uses a Sullivan no. 507 flexible cable, and the rudder uses an inner Gold-N-Rod tube with a solid ½-inch wire pushrod running through it. Make sure the elevator tube is long enough to extend up into the top of the fin, as shown. Let the tube hang free until the fin is built around it. Cover the top of the fuselage with ¾x¼-inch balsa strips and sand smooth. Mark the cut line at former F-6 as you glue the strips into place. When the top is finished, add the nose block and sand it to shape. Cut through the nose block and the fuselage sheeting at F-6 and remove the hatch. Use a small screw, turn latch, or slide latch to retain the hatch at the front. The cut-out piece from F-6 that was glued to F-6A fits into the top opening in F-6 and keeps the rear of the hatch in place.

Build the fin framework over the plan then insert the elevator pushrod through the holes in the ribs, and glue the framework to the fuselage. Use the cardboard template shown on the plan to set

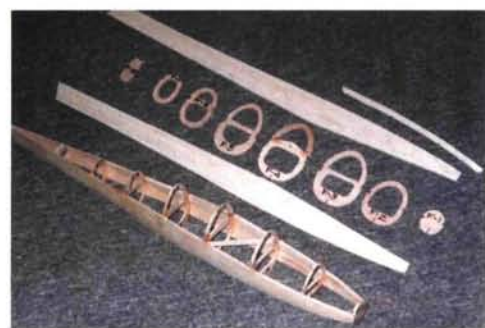
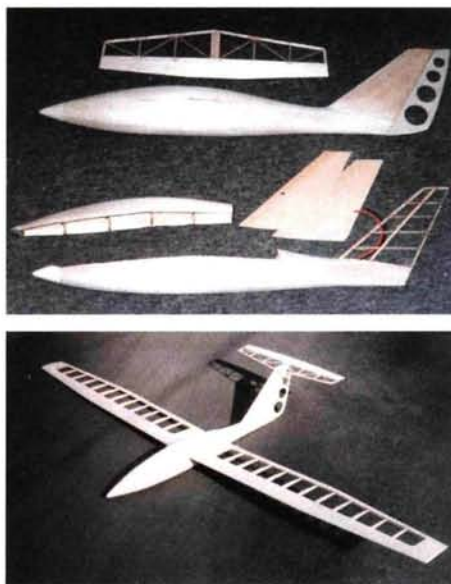
MATERIALS NEEDED

QUANTITY	MATERIAL	USE
2	1/32x4x36-in. balsa	Wing LE and TE covering
1	1/16x3x36-in. balsa	Wing ribs and fin covering
3	3/32x3x36-in. balsa	Fuselage sides, formers, planking
1	1/8x4x36-in. balsa	Elevator, rudder, formers, wing spars
1	1/64x9x9-in. ply	Motor nacelle
Misc.	1/32-, 1/16-, 1/8-in. ply	Former and plates
1	1/8-in. dowel	Wing alignment
1	1 1/2x1 1/2x2-in. balsa	Nose block
1	Sullivan no. 507 cable	Elevator pushrods (three sets, if using ailerons)
1	1/32-in. music wire	Rudder pushrod
2 or 4	Short control horns	

the fin's LE at the correct angle. This template also helps to align the motor nacelle and stabilizer incidence. Cover one side of the fin with 1/16-inch sheet balsa, and glue the pushrod sleeve to the ribs. Run 14-gauge motor power wire through the fin and fuselage. Don't glue these into place, and allow some extra length at both ends so they can be fed into the motor nacelle when you glue it to the fin. Cover the other side of the fin, then blend the fin sides into the fuselage with DPM Model Magic filler.

MOTOR NACELLE

Form the motor nacelle by wrapping 1/64-inch plywood around a 1 3/32-inch-diameter mandrel to form a 7-inch-long tube. For a mandrel, I used a 1-inch dowel wrapped with enough wax paper to bring it to the required diameter. Wrap a little more than two layers of 1/64-inch plywood around the dowel, and glue it with white glue. Hold the plywood in place with masking tape, set the dowel down someplace warm and let it dry overnight. Remove the tape, and sand down the overlapping edge before you remove the tube from the dowel. The wax paper should allow it to come off easily. Be sure the Speed 400 motor fits into the tube. It's OK if it's a little loose because you can wrap some masking tape around the motor



Top: the basic fuselage components are ready for assembly. Balsa sheet sides must be fitted around the formers, then the top and bottom are strip planked. Above: here, two fuselages take shape. The bottom one has the fin attached; the top one needs a few more strips added. Top left: the completed fuselage at top shows the Windex's nice smooth lines; the other shows the large hatch structure to good advantage. Note the power wires in the fin structure. They will be fed into the nacelle when it is attached to the fin's LE. Bottom left: the completed Windex, sanded and ready to be covered. The wing structure is very easy to build.

to form a good fit. Glue the two formers into the tube at the locations shown. They are drawn a little oversize and may require some sanding to fit.

The most difficult part of this project is to mount the motor nacelle on the fin. It takes some cutting and fitting and a little patience. I've done it twice, so I know it can be done. Mark the nacelle location on the fin, then slot the top and bottom of the nacelle to fit over the fin at the correct location and angle. The side view shows the shape of the nacelle "ears" that will overlap the fin. When you are absolutely satisfied that the fit is correct, squeeze the ears so they conform to the sides of the fin and glue them into place. The joint probably won't be very pretty, but it can be spruced up with some filler and sanding. Fill any

gaps with pieces of balsa. The nacelle must be glued all around; be sure it's in line with the top-view centerline of the fuselage, and don't get glue on the motor wires; they must remain free to slide in and out with the motor. Glue the 1/4-inch fin cap to the top of the fin, and sand it to shape. Sand the cap, if required.

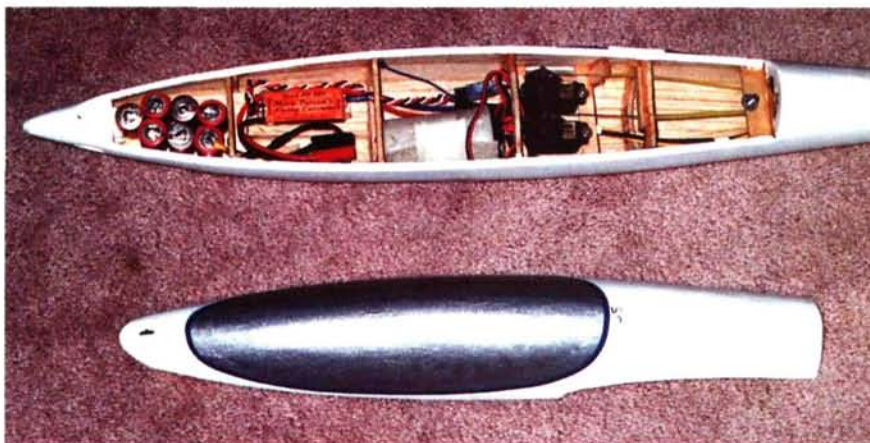
The motor is retained by one 2-56x1/4-inch screw. This goes through the nacelle tube and into one of the indents in the motor housing. Glue a 1/4x3/4-inch piece of 1/16-inch plywood to the front side of the nacelle. Measure from the front of the motor back to an indent, then drill and tap a 2-56 hole at that point in the plywood. Insert the motor, and see that the screw retains it properly. Remove the motor and tape the wires to the outside of the nacelle so they won't slip inside.

WING CONSTRUCTION

Cover the wing plan with wax paper or plastic wrap, then cut out the 1/2-inch sheet balsa trailing edge (TE) sheets. If ailerons

The motor nacelle is simply a thin plywood tube formed around a large dowel and glued into place on the fin's LE. The motor is held in place by a single 2-56 screw.





Left: the relatively large fuselage hatch goes from the nose block all the way aft to former F-6 and covers the top of the wing center section. A single latch pin holds the front in place. Below: more than enough space is available for the onboard equipment. Seven 500AR cells power the motor and receiver through a BEC speed control.

are to be included, make the wider outer TEs and drill $\frac{3}{32}$ -inch holes in the ribs as required for the control cable. Join the bottom wing sheeting over the plan, then pin the $\frac{1}{8} \times \frac{3}{16}$ -inch bottom spar to the plan and install ribs W-2 through W-8. Add the $\frac{1}{8} \times \frac{3}{16}$ -inch leading edge (LE), and glue in the bottom $\frac{1}{32}$ -inch sheet at the center section followed by the W-1 ribs. Use the rib-angle guides RA-A or RA-R to set the correct dihedral angle for $\frac{1}{8}$ -inch W-1 ribs. Lift the TE between W-1 and W-8 off the plan, and tack-glue the washout wedge WO under it. Make sure the LE stays on the plan. Add the top spar and the $\frac{1}{32}$ -inch TE sheeting. Sand the top of the LE to match the ribs, and cover the top and center wing section with $\frac{1}{32}$ -inch sheet. Glue the top sheeting to the top of the LE. Remove the wing from the plan, and sand the LE to shape. Don't glue on the wingtips until after they have been covered. Repeat the process for the opposite wing.

If you want ailerons, cut them out of the wing as shown on the plan. Cap the wing opening with balsa, then add the filler pieces W-2B to the ends of the ailerons. Sand the front edge down so they fit properly in place when the $\frac{1}{16}$ -inch LE balsa cap is added. Cut one side of the base off a small nylon horn, and insert the horn into the end of the aileron. Place a balsa wedge on top of the horn so it sits on the inside of the bottom skin of the aileron, and glue it into place. Don't hinge any control surface until after covering. Join the wing panels at the appropriate dihedral angle so there are $1\frac{1}{2}$ inches under each tip (with ailerons) or 4 inches, if you use rudder control. To join the panels, cut a slot between the spars to fit the appropriate $\frac{1}{8}$ -inch plywood joiner, and epoxy it into place with the tips blocked up the correct distance. Install the Sullivan no. 507 flexible cable through the holes in the wing ribs, and glue it into place. Cut away the center of rib W-1, and install the aileron servo

from the top. It can be held with double-sided tape or glued into place. I prefer to wrap the servo with masking tape and glue it in with a little epoxy.

Position the wing in the wing saddle, and using the hole in F-4 as a guide, drill an $\frac{1}{8}$ -inch hole 1 inch deep into the wing's LE. Insert an $\frac{1}{8}$ -inch dowel, and cut it so that only $\frac{1}{4}$ inch protrudes from the LE. Fit the wing into place so it is tight against the fuselage. If it is not, wedge the dowel up a little in the wing until the fit is good, then glue it into place with thin Zap. Glue the $\frac{1}{32}$ -inch plywood WM to the top of the wing's TE. Set the wing in place on the fuselage, make sure it is positioned correctly, and drill a no. 37 hole through the wing into F-6M. Tap a 6-32 thread in the hole, and enlarge the hole in the wing with a no. 27 drill. Glue a balsa shim on WM to take up any space between it and the wing.

The horizontal stab's framework is made with medium balsa. The $\frac{1}{8} \times \frac{3}{8}$ -inch TE tapers to $\frac{1}{16}$ inch wide at the tip. The elevator and rudder are made from stiff, lightweight, $\frac{1}{8}$ -inch balsa. I cut lightening holes in the rudder but not in the elevator.

Cover the fuselage and flying surfaces with your favorite plastic film. You can hinge the elevator and ailerons with the covering, if desired. Don't cover the top of the fin or the bottom of the stabilizer where they are glued together. Attach the wing, and use it as a guide to position and glue the stabilizer into place. The elevator pushrod exits through the center of the horizontal stab. Attach the small nylon control horns in line with the pushrods, and hook them up to the servos and horns. Install the aileron servo and connect the control cables.

FINAL ASSEMBLY

Install the radio, speed control and battery.



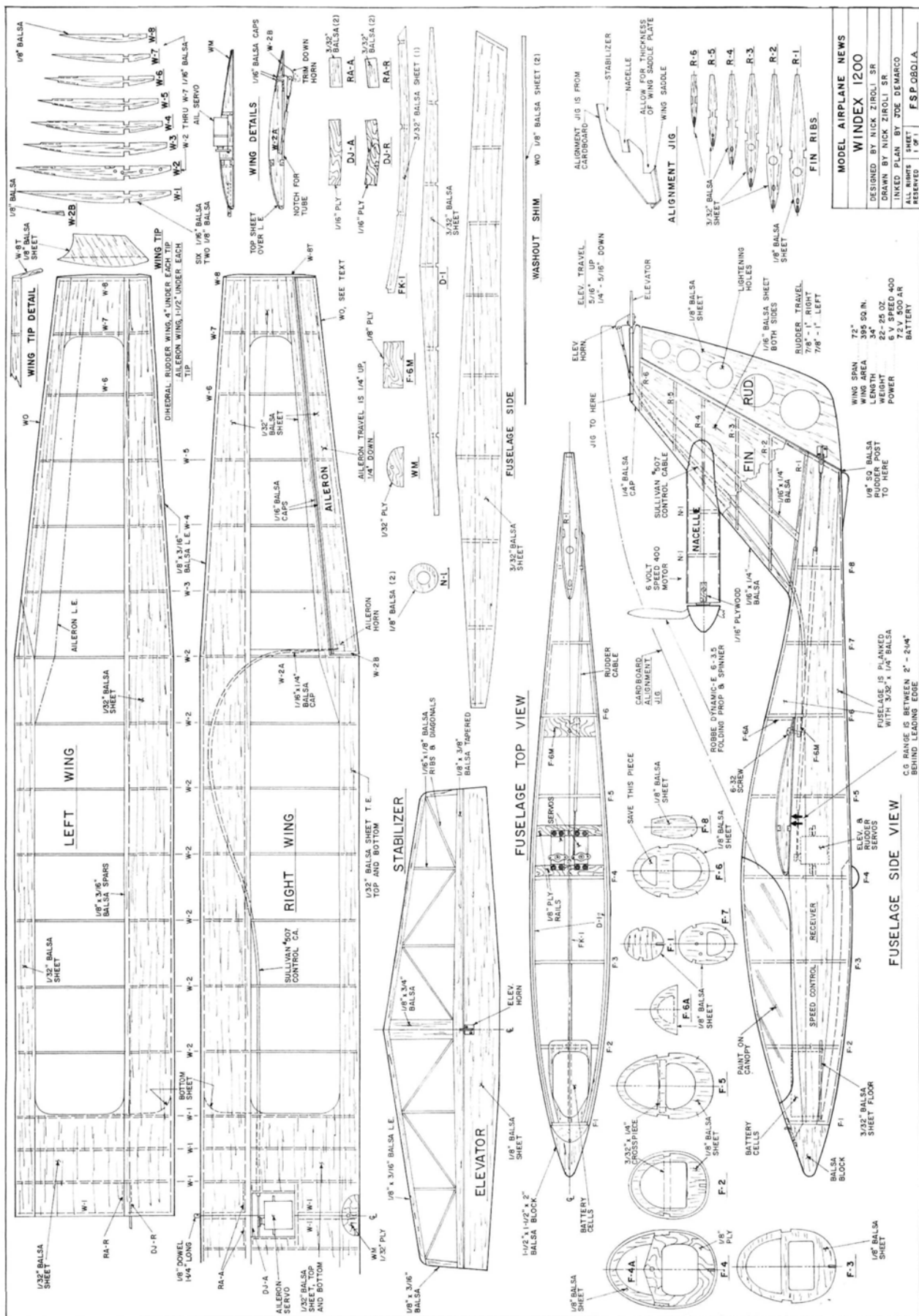
My model balanced perfectly with the battery mounted in the nose. Use a BEC speed control that has a prop-brake feature. A brake is necessary on any powered glider to stop the prop so it will fold. Soaring performance will be nonexistent if the prop doesn't fold. I used a folding Robbe 6x3.5 prop and spinner. I use a 7-cell 500AR battery pack to power the whole system. I have been using the same battery for three years, and I still get excellent performance from it.

AT THE FIELD

Before flying, do a range check, and at a distance, turn the motor on and off to be sure that electrical motor noise doesn't cause interference. Also check that the control surfaces move in the correct directions. If all is well, charge the battery and have fun. I've been asked many times, "Doesn't flying a glider get boring?" My answer is "No; it's quite a challenge." There isn't lots of thermal activity where I live. You must find the thermals and work them for maximum duration.

The model is easy to hand-launch, and the Speed 400 direct-drive motor easily gets the model up to soaring altitude. The model flies beautifully in calm conditions, but rudder control can be sluggish in a strong crosswind. Using the motor sparingly will reward you with extended flight duration. The sink rate is shallow, and landings are easy; there's little chance of breaking the tail-mounted prop.

I hope you enjoy flying your Windex as much as I have enjoyed flying mine. It's a quiet, clean, relaxing form of sport flying.



Airtronics, 1185 Stanford Ct., Anaheim, CA 92805; (714) 978-1895; fax (714) 978-1540; www.airtronics.net.

DPM (Dave Patrick Models), 1811 E. 400 North Rd., Milford, IL 60953; (815) 457-3128; www.modelmagic.com.

Graupner; distributed by Hobby Lobby Intl. **Hobby Lobby Intl.**, 5614 Franklin Pike Cir., Brentwood, TN 37027; (615) 373-1444; fax (615) 377-6948; www.hobby-lobby.com.

Modelair-Tech, P.O. Box 1467, Lake Grove, NY 11755-0867; (631) 981-0372; www.modelairtech.com.

Robbe Model Sport; distributed by Aveox Electric Flight Systems, 31324 Via Colinas, #103, Westlake Village, CA 91362; (818) 597-8915; fax (818) 597-0617.

Sullivan Products, One North Haven St., Baltimore, MD 21224; (410) 732-3500; fax (410) 327-7443; www.sullivanproducts.com.

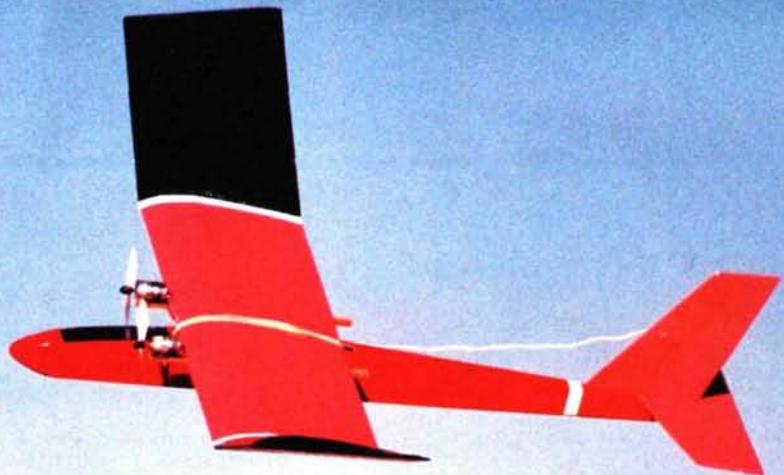
Zap Glue, 9420 Santa Anita Ave., Rancho Cucamonga, CA 91730.

To order the full-size plan, turn to "RCStore.com" on page 148. +

Build a twin electric motor pack

Add-on e-power for your glider!

by Jim Simpson

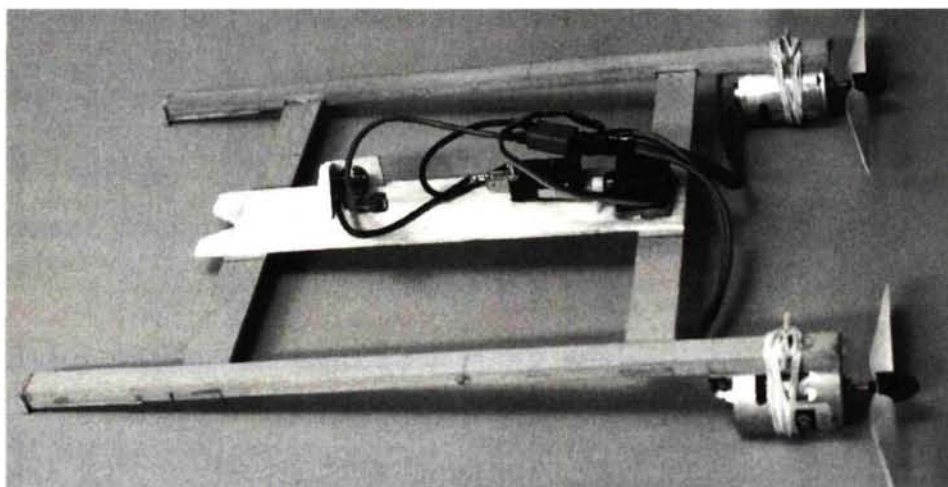


This idea sprang from my desire to adapt the Sunrider 2-meter sailplane to electric power. My early efforts involved difficult and permanent modifications to the nose of the plane. I decided to develop a power system that would not require such permanent alterations. With this new technique, the power unit is simply sandwiched between the wing and the fuselage and requires only one plug-in to work. It can easily be removed to return the glider to its original condition. Although I designed the pack for the Sunrider's flat wing center section, the unit can be modified to function just as well with a polyhedral wing.

An added benefit of the design is the safety afforded if one motor fails. The Speed 400 motors are about as close to the centerline as possible; this minimizes the yaw effect of single-motor operation. The design will even work with four motors. It sounds great and is useful for bomber or towplane duty, but make sure you have an electronic speed control with at least a 40A capacity.

CONSTRUCTION

- 1 Cut all materials to the length, width and thickness required. Notch the basswood motor bearers (A) for the plywood crossbeams (B) if your wing has a flat center section such as that on the Sunrider. If your wing has polyhedral (a Gentle Lady, for example), do not notch part A—just mark the location. In either case, epoxy the assembly as shown in the drawing.
- 2 Epoxy the motor stops (C) to the ends of each part A.
- 3 Glue the $\frac{1}{16}$ -inch-square motor holders (D) into place on the front of each part A (or on both front and rear if planning a four-motor installation).
- 4 Ensure that the center plate (E) fits in the fuselage cavity below the wing, and then glue it into place on each part B.
- 5 Make sure that the safety switch fits well on the switchplate (F), then glue it into place and brace with the triangle brace (G).
- 6 Install Speed 400 motors on the ends of each part A and secure each motor with two rubber bands. Be certain that the bands do not cover the cooling holes on the motors.



This twin electric-motor auxiliary power pack was designed for the Sunrider but will work with almost any glider of comparable size. A four-motor variant works well to serve as a bomber or towplane.

MATERIALS NEEDED

Part		Dimensions (inches)		Thick	Material	Number
		Length	Width			
A	Longeron	13	$\frac{1}{2}$	$\frac{1}{4}$	Basswood	2
B	Cross-member	$8\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{32}$	Plywood	2
C	Motor stop	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{16}$	Plywood	2 (4)*
D	Motor retainer	2	$\frac{1}{16}$	$\frac{1}{16}$	Balsa strip	4 (8)*
E	Equipment rack	9	$1\frac{3}{4}$	$\frac{1}{8}$	Balsa	1
F	Switch mount	1	$\frac{3}{4}$	$\frac{1}{16}$		1
G	Triangle brace	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{8}$	Sheet balsa (scrap)	1
H	Speed 400 motor					2 (4)*
I	Safety switch for main battery power (RadioShack 3A unit or better)					1
J	Lever arm microswitch (operated by third channel servo) for main power					1
K	Typical microservo mount with double-sided foam tape					1
L	Gunther prop/spinner combo, sold by Multiplex USA (part no. 72 4293) and Hobby Club					2 (4)*
N	Wing section					

*for four-motor variant

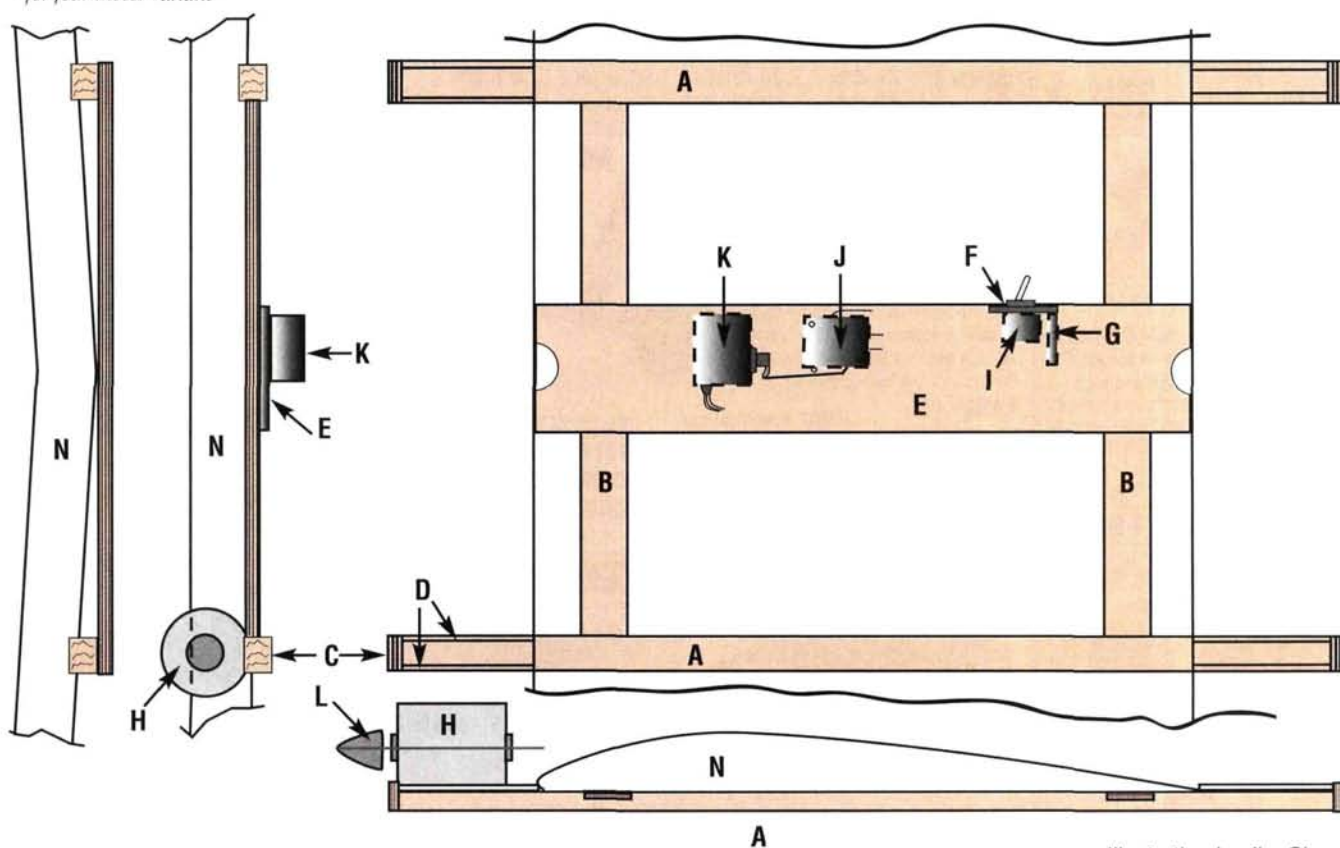


Illustration by Jim Simpson

7 Arrange the microswitch (J) and the servo (K) on the center plate, as shown. Cut the servo-output arm very short and round it, then install it so it depresses the switch arm when the left (throttle) stick is pushed fully forward (up) but relaxes pressure when pulled back (off). When you're satisfied, attach J and K to the center plate with household glue or double-sided tape.

8 Wire up the system. If you do not know how, ask someone who does. Run the motor power wires along the front of part B and down through the half-moon notch into the fuselage cavity where all other wires will be. You can use a common 6- or 7-cell RC car battery, but it must be installed in the fuselage cavity so that the balance point (CG) does not change from its original location on the glider without the motor pack.

The motor-pack assembly shown here is designed to be "trapped" between the wing and the fuselage, and it is secured by stretching two rubber bands from the front of part A to the back, over the wing. When everything is attached, try a few strong, straight-and-level hand tosses to set the trims. Then carefully turn the safety switch on, throttle up, and as your launcher releases the plane, fly straight ahead and climb gently to at least 100 feet before starting to circle. Cut the motors off after you've reached 400 feet and are used to the glide. Repeat this until you are comfortable with your new rig; then relax and enjoy. ✈

Hobby Club Inc., P. O. Box 6004, San Clemente, CA 92674; (949) 240-4626; fax (949) 240-5931; www.hobbyclub.com.
Multiplex USA, 560 Library St., San Fernando, CA 91340; (818) 838-6467; fax (818) 785-3946; www.multiplexrc.com.

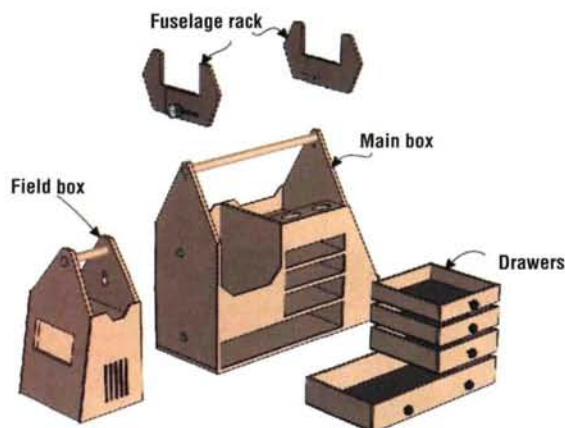
Build a Custom Tool Tote

Multipurpose field box

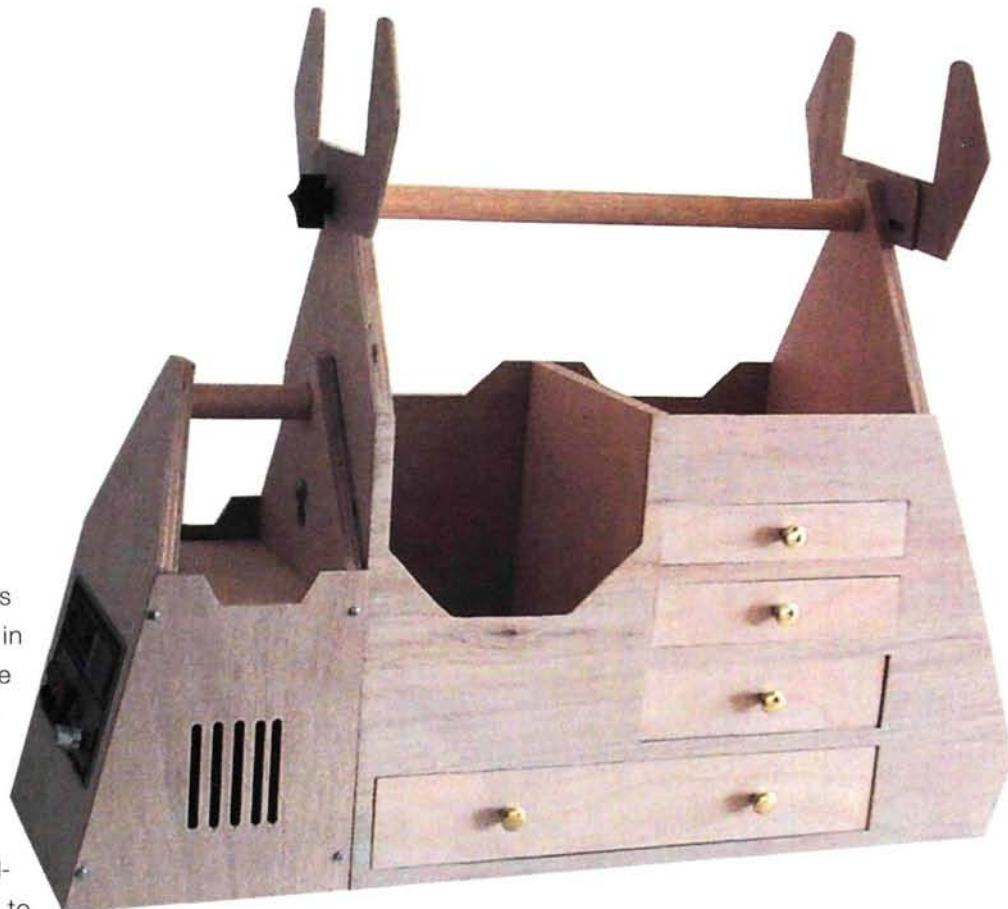
by Michael Duncan

I've built several field boxes from kits but always found them lacking in some way. In some, the fuel bottle was too close to the radio compartment; in others, it was too far from the power panel. Most of them didn't have enough drawer space for tools, propellers and other flight gear. I decided to design my own field box and to incorporate features I found handy on other boxes while avoiding the drawbacks of field-box kits I had built. My plywood field box ("MegaTote") has a protected radio compartment at one end and a detachable power unit. With more than 450 cubic inches of drawer space, it has room to spare, and with a bottom drawer that's more than 13½ inches wide, it can easily accommodate larger propellers and control linkages. To make the box, you'll need: one 2x4-foot, ½-inch-thick plywood sheet; one 2x2 foot, ¼-inch-thick sheet; and a 2-foot-long, 7/8-inch-diameter dowel. Let's get started.

Figure 1. Field-box components



The field box features adjustable fuselage racks, a detachable power unit and a main box with more than 450 cubic inches of drawer space.



MAIN BOX

Start by cutting the ½-inch-thick parts out of the plywood sheet. Refer to the materials list and to Figure 4 for sizes. Cut the box's sides (A) and drill a hole in each for the dowel handles. Then drill a through-hole in the center of each dowel handle hole for the fuselage rack knobs. A spade drill bit works well for this step because it makes a small through-hole while drilling the main hole. On the left side of the box where the power unit will go, drill holes at the locations shown in Figure 4, and then screw in the threaded inserts for the carriage bolts.

Cut the dowel "handles" to length and sand their edges lightly to get rid of splinters. Drill 1-inch-deep, 5/16-inch-diameter holes in the ends of each, and screw in the threaded inserts until they are flush with the end of the dowels.

Cut eight spacers out of scrap wood; you'll use them to space the drawers correctly. Cut two of each drawer-height: 1½, 1⅝, 2 and 2⅝ inches. Use these to separate the drawer shelves temporarily while you glue the box pieces together. Start at the bottom with the 2⅝-inch spacer, and continue upward using progressively smaller spacers. Cut the 17-degree angle on the right side of the bottom (B). This is where you will attach the end piece (H).

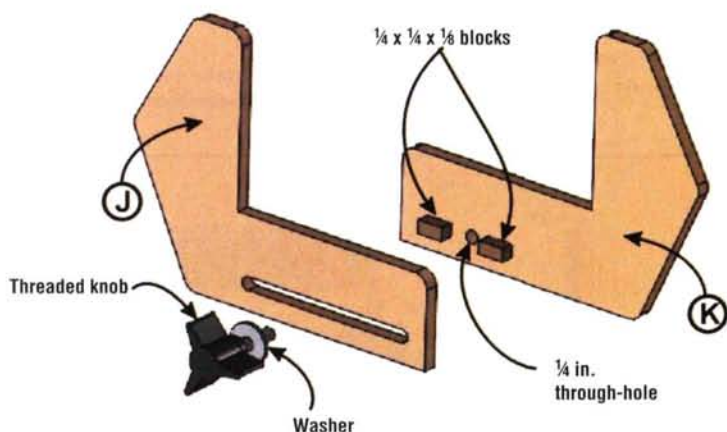
Next, assemble the main box components (A, B, C, D, E, L) to test-fit them, but don't glue them together yet. The box is 7½ inches deep, so make sure you orient the parts correctly. When you are satisfied with the fit, apply wood glue and clamp the pieces together (or use brad nails); remove excess glue with a wet rag. Make sure the parts are squared up, and let the glue dry.

From the ¼-inch-thick plywood, cut the front (F), back (G) and ends (H and I). Don't cut the drawer holes in F; use a router to cut them out once you've put the front in place. Glue and clamp or glue and nail F to the box. Drill a ½-inch-diameter hole in F where each drawer hole will be. Use a router with a flush cutting bit, insert the bit through each hole, and rout out drawer holes. Since the bit leaves radiused corners, use a file to square them up. Now glue G, H and I into place. Sand any rough edges after the glue has dried.

FUSELAGE RACK

Using Figure 4 as a reference, cut two of each fuselage rack piece (J and K) out of the 1/8-inch plywood. Drill a hole in K and cut a slot in J. Cut four 1/4x1/4x1/8-inch guides out of scrap wood. As shown in Figure 2, insert the knob bolt through the slot in J and into the hole in K. Make sure the bottoms are parallel and the guide pieces slide smoothly in the slots, and then glue the guide pieces into place. Sand them until they work smoothly. Screw each fuselage rack onto the dowel handles using the 1/4-20 knobs.

Figure 2. Fuselage rack



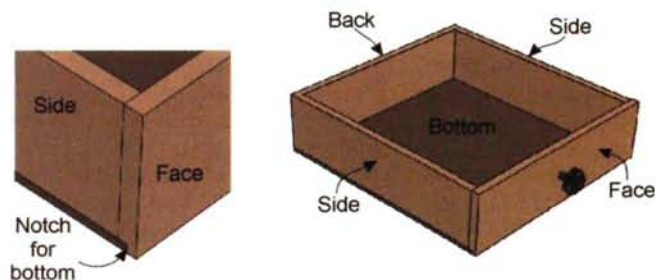
The fuselage racks form a cradle that holds your airplane securely. The threaded knob makes the rack easily adjustable, and foam padding (not shown) protects your model's finish.

DRAWERS

Cut the drawer faces, sides and backs out the 1/4-inch plywood sheet. As shown in Figure 3, cut an 1/8-inch-square notch at the bottom of each drawer face for the drawer bottom to fit into. Cut the drawer bottoms out of the 1/8-inch plywood and sand the edges smooth.

Assemble the side, back and face of the bottom drawer; make sure the bottom of the notch on the drawer face is even with the bottom of the sides. Glue and clamp the drawer together and immediately put the drawer upside-down on the workbench. Make sure all the pieces are squared up, and glue the drawer bottom into place. Place a weight on the bottom to hold it, and let the glue dry. Repeat the same process to make the other three drawers. Attach the drawer knobs to the centers of the top three drawers and about 3 1/2 inches in from each end of the bottom drawer. Sand the drawers so that they'll glide smoothly into their slots.

Figure 3. Drawers



The four drawers are easily constructed out of plywood sheet. Their sizes and shapes help to maximize the amount of useful space in the field box.

MATERIALS NEEDED

PLYWOOD PARTS DIMENSIONS (IN.)

Main box

2 sides (A)	17x7 1/2x1 1/2
Bottom (B)	18 1/4x7 1/2x1 1/2
Drawer shelf (C)	14 1/8x7 1/2x1 1/2
3 drawer shelves (D)	7x7x1 1/2
Center divider (E)	8 1/2x7 1/2x1 1/2
Front (F)	18 3/4x11 1/8x1/8
Back (G)	18 3/4x11 1/8x1/8
End (bottom) (H)	7 1/2x2 1/4x1/8
End (top) (I)	7 1/2x1 3/4x1/8
2 fuselage (slotted) racks (J)	5x6 1/4x1/8
2 fuselage racks (K)	5x6 1/4x1/8

Drawer 1

Face	6x1 7/16x1/4
2 sides	7 1/4x1 3/8x1/4
Back	6 7/16x1 3/8x1/4
Bottom	7 3/8x6 15/16x1/8

Drawer 2

Face	6 15/16x1 9/16x1/4
2 sides	7 1/4x1 1/2x1/4
Back	6 7/16x1 1/2x1/4
Bottom	7 3/8x6 15/16x1/8

Drawer 3

Face	6 15/16x1 15/16x1/4
2 sides	7 1/4x1 7/8x1/4
Back	6 7/16x1 7/8x1/4
Bottom	7 3/8x6 15/16x1/8

Drawer 4

Face	13 15/16x2 5/8x1/4
2 sides	7 1/4x2 1/4x1/4
Back	13 7/16x2 1/4x1/4
Bottom	13 15/16x7 3/8x1/8

Detachable power unit

Front (M)	13x7 1/2x1 1/2
Back (N)	13x7 1/2x1 1/2
2 sides (O)	8 1/2x7x1/8
Bottom (P)	6x7 1/2x1 1/2
Top (Q)	4 1/2x7 1/2x1 1/2

Additional supplies

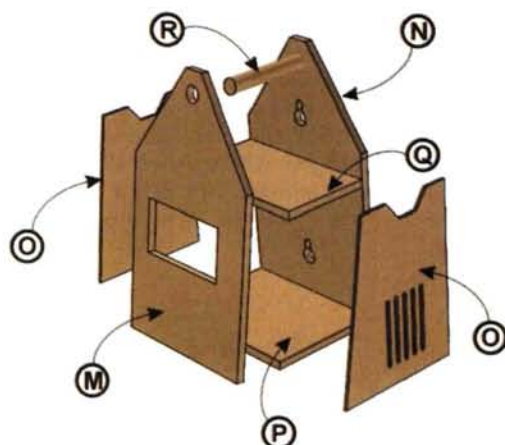
- 5 drawer knobs
- 2, 1/4-20x1 carriage bolts
- 2, 1/4-20 threaded inserts for field-box carriage bolts
- 2, 1/4-20 threaded inserts for fuselage rack
- 2, 1/4-20 threaded knobs for fuselage rack
- 4, 1/8x1/2 sheet-metal screws for battery cover
- 2-foot 7/8-in.-diameter dowel for main box handle and power handle

DETACHABLE POWER UNIT

If you haven't already done so, cut the front (M), back (N), bottom (P) and top (Q) of the detachable power unit out of 1/2-inch plywood. Drill a hole for the dowel "handle." Cut the dowel handle (R) and sand its ends. Cut a 13-degree angle on the front edge of Q and P so that M sets flush with both of them. Sand the pieces to clean up the edges, and assemble them without glue to verify their fit. Drill and cut the keyhole slots in N to the dimensions shown in Figure 4. Test-fit N on the main box by attaching it to carriage bolts that are screwed into the threaded inserts in piece A. Check your power panel's dimensions, then mark and cut out the hole for your power panel in M. Then clamp and glue M, N, P and Q together. Make sure N is square with Q and P, and let the assembly dry.

From the 1/8-inch plywood, cut the sides (O) as shown in Figure 4. Cut the battery-vent slots in the side that will be visible from the front of the box. Sand the sides smooth and verify their fit to the box. Glue one of the sides into place. Attach the other side with screws to allow access to the battery. Position this side on the box and drill 1/16-inch-diameter holes for the screws. Drill through the side and into the edges of M and N to a depth of approximately 1/2 inch. Remove the side and drill out the holes on the side to 1/8 inch. Screw the side to the field box using the 1/8x1/2-inch sheet-metal screws.

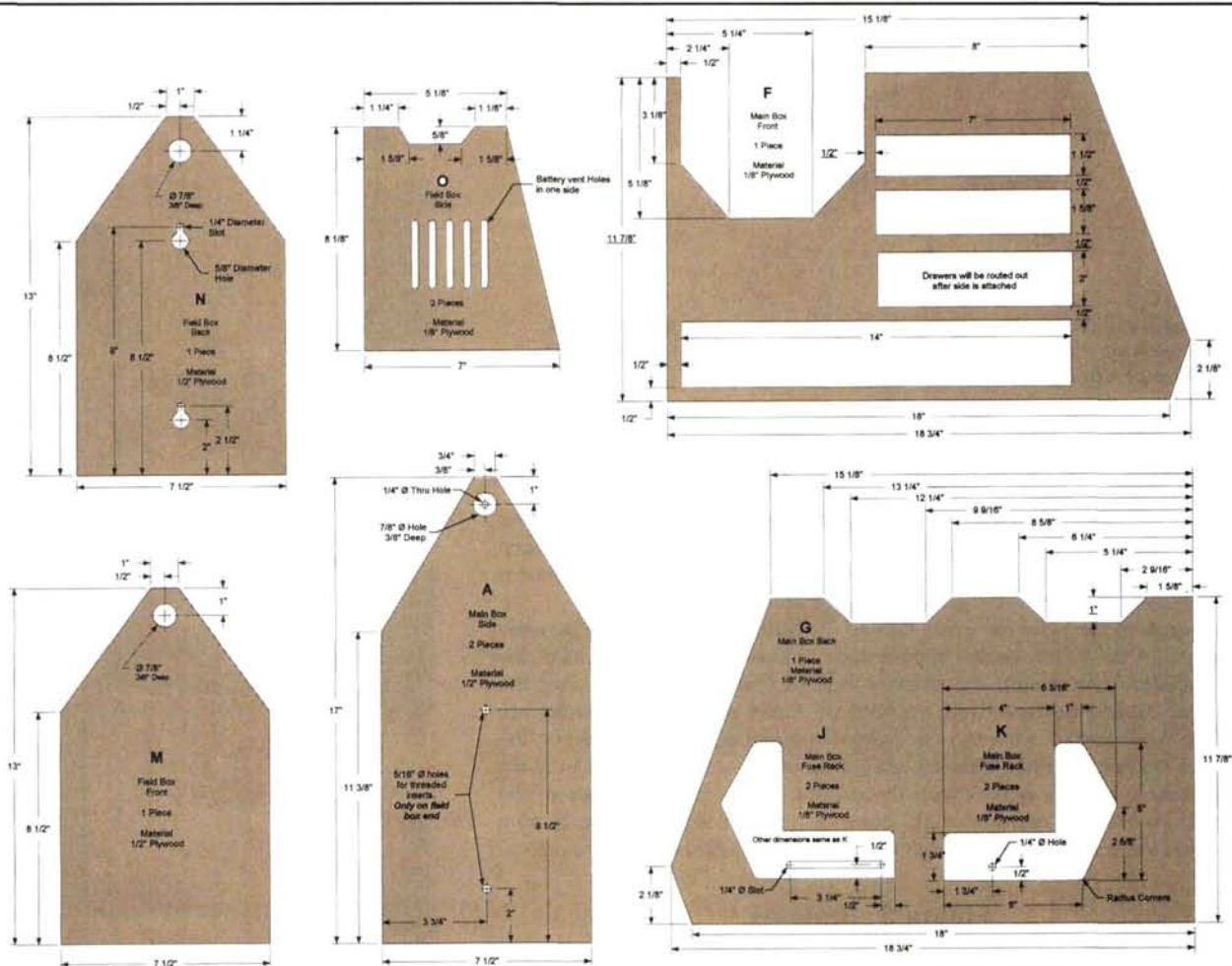
Figure 5. Detachable power unit



The power unit is removable to make starting your model more convenient. When assembled, it houses the battery and power panel.

Figure 4.

All the major components are cut out of 1/8-, 1/4- and 1/2-inch-thick sheets of plywood. The author offers full-size plans for his MegaTote.



FINAL TOUCHES

"Putty" any holes or dents, sand rough edges and surfaces smooth, and then paint your box using a fuelproof paint such as Top Flite's LusterKote. Start with a couple coats of primer, and finish with two or three coats of the final color. Use trim sheets and decals to dress up the box if you like.

Once you've painted your field box and you have the carriage bolts adjusted so

that the box and power unit fit together nicely, use liquid thread-lock to keep the bolts in place. Glue lengths of rubber or foam hose on the fuselage racks to protect your plane's finish. Split the hose so you can slide it over the racks. Note that each rack will require two separate lengths of hose so that the racks remain adjustable. Use foam drawer liners like those used in toolboxes inside the drawers and in the fuel compartment to protect their con-

tents and give the box a professional look. The last steps are: install the power panel; hook up the battery; load up your stuff and convince your family that you have to test the box for a full day at the flying field to be sure it works correctly!

With this information, you should be able to build a custom field box. If you'd prefer to use a full-size plan, send \$12.50 to Michael Duncan, 585 Dublin Ave., Eugene, OR 97404. ♣



O.S. Surpass II-P

O.S. has now added the suffix "P" to its latest .91 Surpass II 4-stroke. As before, the Surpass II designation means you get good power and reliable idling and throttling characteristics. The "P" means you also get a pressure-regulated carburetor and pump fuel-delivery system. But there's more; this engine joins the .52 Surpass and 1.20 Surpass III in having O.S.'s corrosion-resistant plating technology. This feature is relatively new and is very noteworthy, considering the 4-stroke market. Combating low-end corrosion is, in fact, a major concern when performing proper maintenance on any 4-stroke engine—much more so than with a 2-stroke. Unlike 2-strokes, 4-strokes don't breathe through the crankcase. Lubrication is passed down to a 4-stroke's crankcase via a blowby channel (or channels) that open at bottom dead center. Of course, unburned nitro and methanol get blown down into the crankcase as well—and there's the problem. Though lower-quality nitro has been known to cause corrosive acidic solutions to form on low-end components, it's the methanol that is the serious corrosion culprit. Alcohol is *hygroscopic* (it absorbs moisture), and this moisture invades the crankcase and promotes premature, damaging corrosion. O.S. has applied what it calls "corrosion-resistant" plating to all low-end, ferrous components—those being the crankshaft, camshaft and main bearings, which are both of the sealed type. O.S. also went ahead and treated the piston ring, too; it isn't as susceptible to corrosion as the lower-end parts, but what the heck—why not? Notice that O.S. calls this plating "corrosion-resistant," not "corrosion-proof," so after-run oil is still required, especially in humid weather and when the engine will be unused for a long time. I'm sure this plating will eventually show up on all O.S. 4-strokes, if it hasn't by the time you read this. Assuming that the plating lives up to factory claims (and I have no reason to doubt that it won't, considering O.S.'s excellent reputation), I commend the company for this move. Four-stroke engines are more expensive than 2-strokes and are regarded by most modelers as long-term purchases, I'm sure.

FUEL SYSTEM

New on a .91-size 4-stroke for O.S. is the fuel-pump/regulated-carburetor combination. This system not only makes fuel-tank location non-critical, but it also has a positive effect on engine performance. A diaphragm-type fuel pump, mounted off the backplate, is operated by crankcase-pressure fluctuations. The pump's pressure line is tapped into the engine's backplate, directly behind the pump housing. The pump moves fuel from the fuel tank into the pressure-regulator chamber that is an integral part of the Surpass II's specialized carburetor body. The regulator's function is to feed constant, precise positive pressure to the spray-



The breather tap is located in the cam housing. Negative intake manifold pressure helps much-needed lubrication migrate to the camshaft drive gears. It also helps keep the inside of the cowl a bit cleaner.

bar. Other than the pressure regulator, the carb is a standard two-needle type that is also reversible for either a left- or a right-hand throttle-linkage hookup.

BREAK-IN AND PERFORMANCE

For break-in, I ran the engine with an APC 13x5 prop and three 12-ounce tanks of Wildcat's 15-percent nitro Premium Xtra fuel with 18-percent synthetic/castor (80/20) lubricant blend. Take note! With the pumped version of this engine, the instructions are very specific about initial run time. You're told to run the engine in the beginning with the carb barrel opened no more than $\frac{3}{4}$ for 2 to 3 minutes to ensure that the pump's functioning has come up to full potential before you go to

fully open venturi. I have to be honest; I'm not sure, but I think that the only reason this is necessary is to work the pump's diaphragm to full flexibility, thereby giving full pumping volume. It doesn't really matter if I'm right or if I'm wrong, though; what does matter is to follow the instructions.

To my amazement, after only $1\frac{1}{2}$ tanks of fuel, the engine's ring and sleeve had attained an excellent fit, and the .91 was already holding compression as though it was well broken in. I mean, what are we talking here? Eighteen to

20 ounces of fuel through a brand-new engine? Now that's a testament to O.S.'s level of machining fit and finish expertise. Fantastic compression seal notwithstanding, I ran the remaining tank and a half of break-in fuel through. This engine is a beauty; break-in is a one-time deal—so just do it.

As you can see from the rpm in the performance chart, this 4-stroke packs a punch. The 13x10, 14x8 and 15x6 all turn up in the 9,000rpm neighborhood (nice neighborhood!), and each of these props would work well on the .91, depending on the drag of the airframe you mount it in. I used all APC props except in the 13x10 and 14x8 sizes; I also ran Master Airscrew's Scimitar prop. These props seemed to work well and needed only minor balancing, just



Lower-end parts that have the new O.S. corrosion-resistant treatment are the crankshaft, camshaft and crankshaft bearings, which are also of the sealed variety. Note the oil hole in the crankshaft; this directs oil onto the camshaft's drive gears, lobes and ball bearings—a very clever setup.



The aluminum piston has large relief holes in its skirt for balancing purposes. As a result, the .91 is a pretty smooth runner. The wristpin has Teflon pads on both ends, and the piston ring also has O.S.'s corrosion-resistant treatment.

as the APC did. Interestingly, you can see how the APC out-turned the Master Airscrew in the 14x8 size, but was then out-turned in the 13x10—go figure. I'd love to mount this engine with a 12x12 prop in my super-sleek The World Models Dago Red Mustang racer with retracts and take some speed readings.

Starting, throttling and idling characteristics were superb—truly. The engine never once kicked back during starting, and throttle response was very positive. I did notice that going to full throttle immediately after startup sometimes caused a slight hesitation, but this didn't happen after the engine had run for a few seconds. I think the regulator pressure needs to stabilize. The engine idled down to 1,650rpm on the 15x8 prop, but a 1,900 to 2,100rpm idle is more realistic for most usable prop sizes and is still very good, even if you're flying off a low-resistance, paved surface.



The stock muffler is equipped with internal baffling. A pressure tap is not needed with this fuel-pump engine.



Above: diaphragm fuel-pump housing is neatly tucked behind the engine's backplate. The fuel pressure regulator is under a black plastic cover on the carb body. This system worked perfectly without any adjustment. Left: the carb can be reversed to fit either left- or right-hand throttle-linkage hookups. Note: both high- and low-mixture adjustments are on the same side of the carb body.

CONCLUSION

I guess you could say I really liked everything about this engine except for one thing: I didn't like what came in the box. Or should I say what didn't come in the box—tools! They give you no tools at all. OK; if you want to leave out the 14mm and 12mm open-end wrenches for the prop nuts, fair enough. Although other 4-stroke manufacturers include such tools, most modelers already have good wrenches in their flight box for safe prop tightening, especially if they're into 4-strokes. But to leave out the feeler gauge and wrench for valve-adjustment purposes is going too far, in my opinion; we're talking pennies here. I'll add that the new O.S. .91 Surpass II-P is a nearly perfect model engine in terms of power, craftsmanship and handling. In my book, an engine such as this makes it a pure pleasure to fly the model it's mounted in. ✦

SPECIFICATIONS

Engine name: O.S. .91 Surpass II-P
Distributed by: Great Planes Model Distributors
Displacement: .912ci
Hp: 1.6hp@11,000rpm
Bore: 1.091 in.
Stroke: 0.976 in.
Piston/sleeve: aluminum-ringed steel
Suggested rpm range: 2,000 to 12,000
Weight: 23.9 oz. with muffler
Width: 2.36 in.
Length: 4.8 in. to thrust washer
Height: 4.84 in.
Shaft diameter: 8mm
Street price: \$299

Hits

- Excellent workmanship.
- Good power.
- Excellent idle and throttle response.
- Quick break-in.

Miss

- No tools included.

Weather conditions

Temperature: 69°
Relative humidity: 72%
Barometric pressure: 30.11

Rpm performance

APC 13x611,280
APC 13x810,100
APC 13x109,180
Master Airscrew Scimitar 13x10	...9,220
APC 14x79,380
APC 14x88,990
Master Airscrew Scimitar 14x8	...8,640
APC 15x68,950
APC 15x88,580
APC 16x87,330
APC 17x86,390

All tests were performed using 15-percent nitro Wildcat Premium Xtra fuel with 18-percent synthetic/castor (80/20) blend.

APC Props; distributed by Landing Products, 1222 Harter Ave., Woodland, CA 95776; (530) 661-0399.
Great Planes, P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; fax (217) 398-0008; www.greatplanes.com.
Master Airscrew; distributed by Windsor Propeller Co., 3219 Monier Cir., Rancho Cordova, CA 95742; (916) 631-8385; fax (916) 631-8386.
O.S.; distributed by Great Planes; www.osengines.com.
The World Models Mfg. Co. Ltd., distributed in the USA by AirBorne Models, 2127-H S. Vasco Rd., Livermore, CA 94550; (925) 371-0922; fax (925) 371-0923.
Wildcat Fuels, 3005 Park Central, Unit T, Nicholasville, KY 40356; (606) 885-5619.

*A new approach to
the ultimate radio*

MULTIPLEX USA

Profi mc 4000

by Bob Abele

Although European-style radio systems such as the Multiplex Profi mc 4000 may look unusual to U.S. modelers, all will appreciate the useful features packed into this one. The Profi mc 4000 is Multiplex USA's top-of-the-line radio; it offers several unique features in a fine, German-made RC system. Its 12 channels are all fully functional and can be assigned to any control or mixer output. It has memory capacity for up to 100 models and a computer-interface feature that allows unlimited memory storage. This makes for an amazingly capable and versatile system; it's well suited to being the flagship of Multiplex USA's line. Expert pilots, take notice: this radio has it all.

ABOUT THE SYSTEM

I reviewed the Profi mc 4000 International set. It's the most comprehensive of the Profi systems, and it retails for \$1,133. It consists of a 12-channel transmitter with a removable frequency module on one of the U.S. 72MHz RC aircraft channels, a 6-cell, 1800mAh transmitter battery, a Mini 9-channel receiver, four Profi 3 ball-bearing servos, a switch harness, a 4-cell, 1300mAh Ni-Cd receiver battery pack, a set of charger leads, a frequency flag and an extensive instruction manual. The other two versions are the Basic system with the transmitter, its battery, an RF module and a charge lead for

\$740, and the \$879 Vario set that includes the transmitter and battery, RF module and Mini 9 receiver.

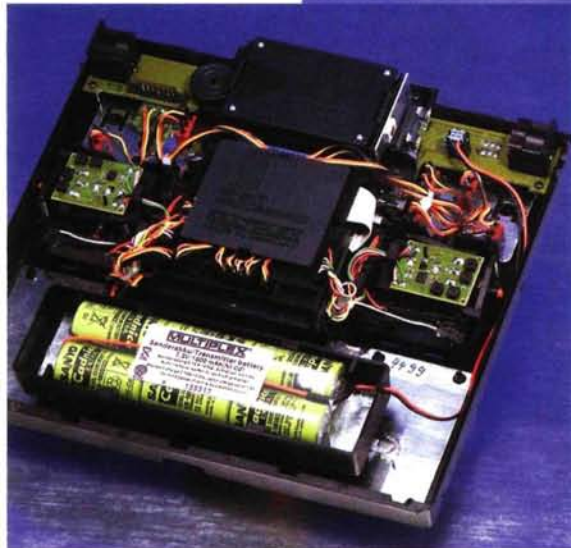
Although the system I evaluated did not come with a dual-output battery charger, Multiplex USA has advised me that all future production units will be supplied with chargers. Note that the transmitter has a 6-cell (yes, 6; not 8!) 1800mAh Ni-Cd battery pack. The transmitter has a built-in discharge circuit which, when activated, will discharge the transmitter battery down to 1 volt per cell then cut off automatically, leaving the capacity recorded on the LCD screen. To my knowledge, this is a first in an RC system.

The Profi 4000 offers 12 channels, all of which are fully functional without any restrictions; e.g., all have endpoint adjustment, servo-reversing, etc. Any channel can be assigned to any control or to any mixer output. In fact, all 12 channels can have up to a total of eight mixers. Model memory is variable, depending on the number of control inputs stored in each position. Generally speaking, up to 100 simple model setups can be stored in the model memory (20 to 25 models can be stored if they employ more complex memory situations). Each memory position can be assigned a name that's up to 15 characters long. Using an optional cable,



PHOTOS BY WALTER SIDAS

Right: the Profi mc 4000 International set is Multiplex USA's top-of-the-line radio system, and it includes everything you see here. Of particular interest are the four Profi 3 ball-bearing servos and the 9-channel receiver. Below: a radio with this many features requires a strong transmitter battery. The 1800mAh pack that Multiplex provides has plenty of capacity, but its 6-cell configuration is unconventional.



ABOUT THE TRANSMITTER

At first glance, the Multiplex Profi 4000 transmitter seems very large. It is, in fact, wider than most transmitters, but not as thick. It also seems on the heavy side, yet it actually is no heavier than most other top-of-the-line, 10- to 12-channel transmitters. Using the optional transmitter-supporting tray helps ease any strain. Medium and long control-stick extensions are also supplied with the system. The two dual-axis control-stick assemblies are both set up to be self-centering, but you can easily install a supplied ratchet device on either stick assembly for regular throttle control.

Because the pilot can assign the various functions to any of the controls, Multiplex chose not to label switches and pot levers on the front of the transmitter. Once you have assigned the functions, you may use the supplied stick-on labels to identify all of your controls.

The trim levers look like conventional trims. They are actually digital, but they are activated by levers. They have ratchets that allow one click of trim at a time. The center position provides positive feel for neutral trim—a neat feature!

As with all computer transmitters, the heart of the system is its 2½x1-inch LCD display. Beneath the access panel is a set of



it is possible to transfer memory data from one Profi 4000 to another. With another optional cable, you can transfer memory information to any PC, so you can actually store an infinite number of model setups. You can also program the transmitter controls in your PC and then transfer them back to the transmitter.

A servo test function will let you call up a screen that displays the position of all 12 servos (if you use that many). Using this, you can check all your control inputs and mixer presets simultaneously to make sure they are where you want them to be. The servo display is very easy to follow. The menu system is set up to enable you to fly fixed-wing aircraft, gliders, or helicopters. Each of these "base types" allows you to select basic or specific templates to cover each of the three model types. There is also a base type to handle RC cars and boats, provided you use the channels prescribed in the U.S. A final base type is designated "universal." This is the base type from which you can do everything; however, it forces you to assign all your functions yourself.

SPECIFICATIONS

Model: Profi mc 4000 International set

Type: 12-channel computer radio

Distributor: Multiplex USA

Transmitter: 3 lb., 3 oz. (51 oz.); approximately 9x9½x1¼ in.; 12-channel dual stick (Mode II, Mode I, or any mode); removable RF module.

Receiver: Multiplex Mini 9 DS-IPD (1.2 oz.; 2½x1½x1¼ in.); dual-conversion circuitry operating on FM (PPM) with fail-safe hold and preset features; nine channel functions; JR-type connectors with same color code; 35-in. antenna.

Servos: Multiplex Profi 3 BB FET with double ball-bearing-supported output shaft; 1.7 oz. each; 64 oz.-in. output; 0.17 sec. transit time for 60 degrees of rotation; 12-in. cable.

Accessories: switch harness with charging jack, 4-cell 1300mAh Ni-Cd battery pack with heat-shrink case (7.3 oz.), servo-mounting hardware and extra output arms, frequency-flag set and a 94-page instruction manual.

Weight of airborne pack: 15.8 oz. (receiver, four servos, switch harness and battery)

Street prices: \$740 (Basic set); \$879 (Vario set); as tested, \$1,133 (International set).

Features: 12 channels, up to 100-model memory (unlimited with PC interface), fixed-wing, glider and helicopter control-capable; compatible with Airtronics and JR equipment; charging jack has battery voltage available for testing purposes; 6-cell, 1800mAh Ni-Cd transmitter pack; available on all 72MHz RC aircraft channels.

Comments: the Profi 4000 has an infinite number of control combinations that can be tailored to any pilot's needs; fast and precise servo operation. Patience will be necessary to get the most out of this system; it is definitely intended for the expert RC flier.

HITS

- Lots of available memory (unlimited with optional PC interface).
- Controls can be tailored to the pilot's specific needs.
- FM (PPM) receiver provides fail-safe hold and preset operation.
- Transmitter has a built-in battery discharger/tester.

MISSES

- Instruction manual is not well organized.

The controls on the Profi have only generic "abc" labels because any function can be assigned to any input. The LCD screen is the centerpiece of the system, and all the features are programmed using the eight buttons under the access panel shown at the bottom of the photo.

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MULTIPLEX PROFI MC 4000



As you would expect of a premium radio, the Profi comes with a removable RF module so you can change frequencies quickly and easily.

The connector for this system is called the "uni." It appears to be much like a JR-type connector and uses the same orange (signal), red (center, battery positive) and brown (battery negative) color-coding. The battery-to-switch harness connector is

something I have not seen before. Let's just call it Multiplex-proprietary.

The supplied Multiplex Profi 3 servos each have a double ball-bearing-supported output shaft with metal gears. The output shaft has a spline gear for output-arm positioning. The rated torque output and transit time are 64 oz.-in. and 0.17 second per 60 degrees of rotation, respectively. The servo cable is longer than 12 inches.

The battery pack is quite heavy-duty and is comprised of 4, 1300mAh Sanyo Ni-Cd cells. The switch harness has two connectors: one goes to the receiver, the other to the battery. The sliding panel on the switch harness housing yields access to the charging jack. The total airborne weight of the receiver, four servos, battery pack and switch harness is 15.8 ounces.

The various channel functions can be configured to use endpoint adjustment, dual-rate control, servo centering, servo-reversing, exponential-rate control, adjustable trim travel, aileron differential control and a variety of programmable mixing controls. Any of the 12 channels can be set up for slow servo operation. This can be used for retracts, throttle-mixture control and even wheel brakes.

AIRBORNE GEAR

The Multiplex Mini IPD (intelligent pulse decoding) FM (PPM) dual-conversion type of receiver is supplied with the Profi. The IPD circuit provides fail-safe operation in an FM receiver (normally, this feature would be available only on a PCM system!). If interference occurs, the receiver will hold at the last good signal. Using an optional programming cable, you can preset fail-safe positions for each channel function (such as throttle low and flight controls neutral).

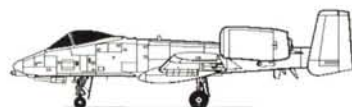
My friend George Steiner recently performed his usual series of lab tests on this same receiver and found it to be excellent in every respect—one of the best RC receivers he has ever tested.

CONCLUSION

The Multiplex Profi mc 4000 is definitely a high-quality RC system intended for the expert flier. It provides excellent selectivity, sensitivity and immunity to outside interference. The system includes very fast and precise servos. Its numerous features make it somewhat complicated to use at first, but once mastered, it provides everything an expert RC flier would want in a radio; furthermore, the ability to link to a PC expands the options for this transmitter. Multiplex USA has also set up a 24-hour product-support line via Club Profi 4000. If you want to be on the winning edge, this is the system you will want to look at seriously.

For more information on the Profi 4000 system, check out the website at www.multiplexrc.com/tx_profi4000.htm. ✦

Multiplex USA, 560 Library St., San Fernando, CA 91340; (818) 838-6467; fax (818) 785-3946; www.multiplexrc.com.

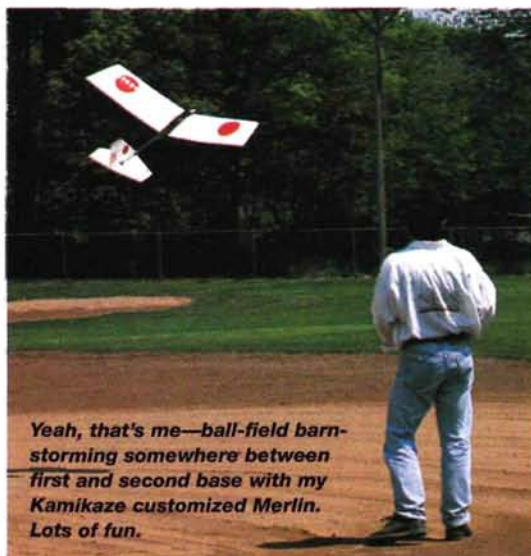




Welcome to the "fly anywhere, anytime" club

I wish I had a nickel for every time a non-modeling friend has asked me, "Chris, can't you just fly one of your RC airplanes *here*?" as the inquiring buddy points to a softball field, an empty lot in the neighborhood, a large backyard or some other nearby open space. Tell you what, I've been doing this RC "thing" for three decades, and I surely would have collected enough nickels by now for the purchase of a Bob Violett F-16—with true turbine power! Disappointingly, the answer to that question was always, "No; I'm sorry; I can't fly it here." Happily, the answer today is "Yeah, sure. We can fly it here." This simple switch from "No" to "Yes" when I answer this long-asked question has dramatically changed the face of RC airplane modeling forever—and for the better, in my humble opinion. It has also given rise to this new column, "Backyard Flyer," to which I welcome you.

I know that for a time, there has been a niche "micro" market and that small groups of modelers have enjoyed this slow flyer/park flyer thing, but now all the big manufacturing names are into it, too. That means a wonderful diversity of available products at affordable prices. I'm talking dependable, easy to assemble, electric-powered mini-models with performance. Moreover, these models are designed to maximize the success of newcomers as never before. I think it's great. Go ahead; call me silly, but the more of us there are having fun, the better I like it!



Yeah, that's me—ball-field barnstorming somewhere between first and second base with my Kamikaze customized Merlin. Lots of fun.

This column will cover everything from picnic-table carrier landings with antique designs (Langley style!) to high-speed soccer-field pylon racing—and everything in between. One recurring topic will be flying sites—sites such as sports fields, parks, driveways, ponds (yes, a few ARF floatplanes are already available in this micro category), empty parking lots and even unused (or not so unused) shuffleboards. And then there's fun stuff like portable runways. A "chaologist" (scientist of chaos) would have a field day studying this era of the "fly anywhere, anytime" tiny RC airplane. It's just the beginning, and anything and everything can and will happen. If you guys (or ladies) have

any creative input that will enhance the fun, please email me at chris@airage.com, or write to me at Air Age Inc., 100 East Ridge, Ridgefield, CT 06877 USA.

Of course, all the latest support equipment that will facilitate your success and enjoyment within this new world of the micro RC model—things such as new kits, radios and geared and un-geared power systems—will be featured regularly here in "Backyard Flyer."

Last, but certainly not least, comes safety. It's true that many of these new models are far too light and slow to do any damage, but don't even think about flying one next to a busy road because you might distract drivers and cause an accident. And don't fly close to a designated RC flying field and interfere with other RC'ers' radios—or have interference from theirs shoot down your beloved park flyer. The AMA recommends that you be three miles away from a flying field.

So, if you're an experienced RC modeler who has a big backyard or a vacant lot across the street, or you want to take a cute scale model on your next vacation, this column is for you. On the other hand, if you happen to be someone who has always wanted to get into RC but never had a club or a designated flying site within an hour's drive, again, I say join me in the backyard flyer experience. Whichever category you fall into, I guarantee we'll have fun.

Remember, our motto is "Sure, we can fly it here!"

Megatech Merlin

As I see it, the contents of Megatech's Merlin box are a recipe for RC success—a package of flying fun, if you will. Not only is everything you need included, except AA batteries for the transmitter, but the assembled model is an extremely docile flyer that's also quite rugged; in fact, I believe it's the most rugged of its type. There's lots of carbon fiber and high-nylon-content plastic—the kind that doesn't crack easily—incorporated in the Merlin's structure. I've flown a number of Merlins and tried to break them all. After several attempts, I did eventually break one, but it wasn't easy. I think it was the dive into a baseball backstop overhang that ultimately did the trick. But even at that, only the prop and one of the Merlin's carbon-reinforced wings were crunched. Megatech



Dogfighting; what could be better? As editorial director Tom Atwood unsuspectingly flies the stock-finish Merlin, I close in from below for the "kill."

includes an extra prop and prop shaft with the model, and all other parts are readily available at reasonable prices from Megatech. Some "vintage" slow flyers that have a similar appearance to the Merlin are notorious for breaking at the drop of a hat. The Merlin, however, is designed to survive in the real world, where unexpected "you-know-what" happens.

Continued on page 118



The Merlin is truly a complete package. Everything except AA batteries is included—even a 6-cell NiMH battery pack and a specialized charger; a 7-cell NiMH is also available.



Enhancing this little model's resilient structure are two other features I like: a ball-bearing 5.6:1-ratio gear-drive system and nickel-metal-hydride (NiMH) batteries with the appropriate charger. This battery/charger combo gives the Merlin upwards of a 10-minute flight duration; this is after a few charge/discharge cycles that bring these batteries up to their full potential. The gear reduction, which also helps to improve duration, allows a big, 12-inch-diameter prop to be swung. This large, relatively slow turning, efficient prop gives the Merlin lots of low-speed thrust—a welcome feature when barnstorming in tight spaces.

Barnstorming in tight spaces is a prerequisite for slow-flyer classification—and it's something the Merlin really excels at. With the control throws set in the

high position, this model will twist and dance around you like a huge butterfly. Don't be concerned about the wing flexing; the Merlin can take it. I've even done full-bore tight stunting in slightly gusty conditions without a problem. With the controls set in the low position, the rank beginner can learn to fly with the gentle Merlin very quickly. That's also partly because he or she won't be taking time out to run back to the shop for repairs after minor, and even not so minor, mishaps. With the large, efficient prop and good-size wheels, the Merlin takes off, even from slightly rough surfaces, without a problem.

Building the Merlin takes less than an hour because it literally snaps together. One of the coolest things is how the decals are applied. They go on just like those removable tattoos kids love, except they're permanent. When applied, they look painted on and weigh nothing—totally ingenious. During the assembly process, I do recommend that you put a drop of thin CA where the stick fuselage end slips into the firewall and also on the pushrods where they go into the clevises. We did have one clevis come loose. As a result, the Merlin crashed from about 30 feet high, but it didn't sustain any damage, and I was up and flying within 10 minutes. I told you it's tough. And for \$199.99 for the total complete package, the Merlin is a winner and fun to own.



SNEAK PEEK



V-Max Probe pusher

This is the V-Max Probe pusher designed by Jerry Small. It's an all foam scale model of an experimental aircraft designed to break the world speed record. Powered by a GWS motor (7.2V 110mAh Ni-Cd battery) turning a 4:1 gear box and 7x6 prop, it's a great little flyer that tracks well and is, as you can see, very cute. Watch for the construction article—and other in-depth slow-flyer and park-flyer features—in our sister publication, *RC MicroFlight*.



All onboard electronic equipment (servos, speed control and receiver) is already wired up and enclosed in this box, which comes mounted to the fuselage boom.

GWS; distributed by Balsa Products Engineering, 122 Jansen Ave., Iselin, NJ 08830-2601; (732) 634-6131; www.balsapr.com; Global Hobby Distributors, 18480 Bandilier Cir., Fountain Valley, CA 92728-8610; (714) 964-0827; fax (714) 962-6452; Horizon Hobby Inc., 4105 Fieldstone, Champaign, IL 61822; (217) 355-9511; www.horizonhobby.com. Megatech; distributed by America's Hobby Center, P.O. Box 32 North Bergen, NJ 07047-0032; www.megatechrc.com. ★

UPPERSPACE

ModelCAD

Cutting-edge design tool

by Jim Boyce

You have a great idea for a new airplane that will beat all the other planes at the field, or maybe you want to build a scale model of your favorite bird but can't find a set of plans or a kit. What's the solution? Draw your own plans, of course! Prop a hollow-core door on a table, add a vinyl top, a straightedge, some triangles and other drafting tools, and—several hundred dollars later—you're the proud owner of a drafting table. Then the hard work begins: drawing, erasing, redrawing, erasing; you'll have eraser crumbs littering the floor in no time.

SPECIFICATIONS

Program: ModelCAD

Type: computer-aided design for modelers

Manufacturer: Upperspace

System requirements: Windows 95/98 or NT (version 4.0 or later)

486DX processor

16MB of RAM

Super VGA graphics card with at least 256 colors

Super VGA monitor with at least 800x600 resolution

Price: \$99.95

Features: most basic 2D drawing tools; fully compatible with DesignCAD; can export drawings in AutoCAD DWG format; can import scanner bitmapped graphic formats such as JPG, PCX and BMP; can open standard DXF, DMF and VRML formats; can import DWG, DXF, IGES, WMF, HPGL and XY formats.

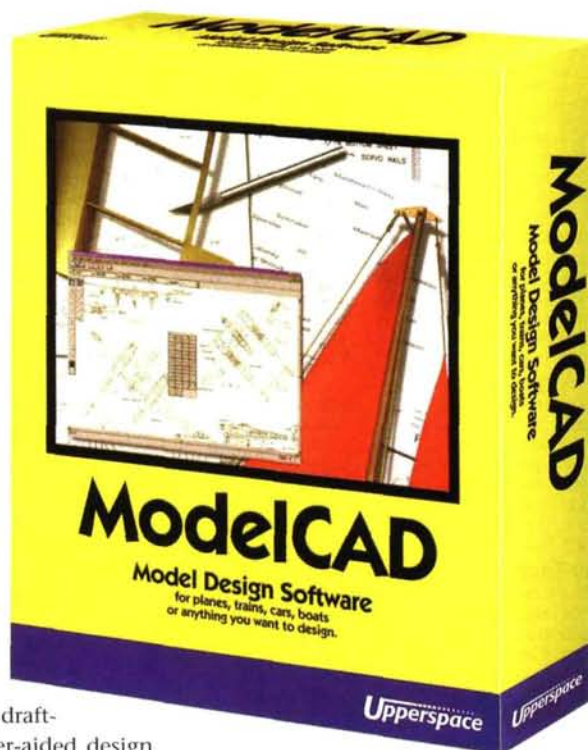
Let's fast-forward to the 21st century. If you have a computer, you can do what most engineers, architects and designers have done and replace the drafting board with a computer-aided design (CAD) program. These professionals have made the switch for good reasons: they can complete designs in considerably less time, have unlimited ability to edit and modify their designs and can quickly identify and rectify design problems. Those benefits can be used in all design disciplines, including modeling.

CAD programs can be bewildering to novices who don't have a drafting or design background, but in my experience, most modelers are pretty sharp and have good visualization and spatial skills, so even if you're new to CAD, you shouldn't have too much trouble navigating the learning curve. If you have even a little drafting experience, you'll be up to speed in no time.

One CAD application targeted specifically at modelers is ModelCAD by Upperspace (www.upperspace.com); it offers 2D drafting and design features for a list price of \$99. ModelCAD requires a PC running Windows 95 or 98 with a minimum of 16MB of RAM. The program consumes about 19MB of disc space for a complete installation, but if you need to save space, don't install the optional components, such as the included "symbol libraries." I ran the program under Windows 2000 Professional, although ModelCalc (covered later) would not run on that platform. Upperspace does not support ModelCAD on any platform other than Windows 95/98.

FEATURES

ModelCAD offers most of the basic 2D drawing tools you should expect to find



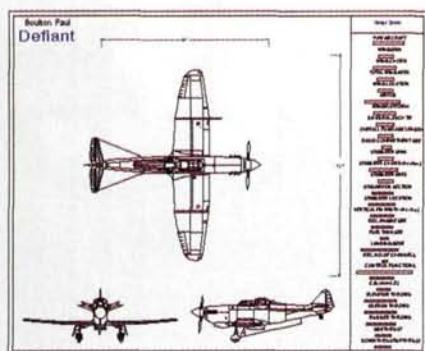
in a 2D CAD

application. For example, it offers more than a dozen ways to draw single and double lines, including point-to-point, parallel, perpendicular, tangent to a circle, etc. Drawing arcs, circles, ellipses, elliptical arcs and polygons is also a snap. For polygons, you specify the number of sides and then the length of a side or the polygon's center and a vertex, and ModelCAD will draw the polygon accordingly.

You have to specify points to draw any shape, and you can specify absolute, relative, or polar coordinates to define points and distances when drawing. Like other CAD applications, ModelCAD includes grid and snap functions that you can use to select coordinates more easily, and the point-selection tools will help you to select tangents, intersections and other geometrical parameters.

One major benefit of any CAD program is the ability to reuse drawings. Why draw the right wing when you've already drawn the left one? You can simply copy and mirror one wing half to create the other. ModelCAD includes a selection of features for reusing data. You can easily select the pieces you need to duplicate, copy them to the clipboard and insert them where they're needed. The program also lets you create linear and circular arrays to quickly produce several copies, and you can always save a symbol or an element for use in another drawing.

ModelCAD provides a wide selection of hatch patterns, although hatching's usefulness is somewhat limited. You specify points for the hatch boundary and



ModelCAD

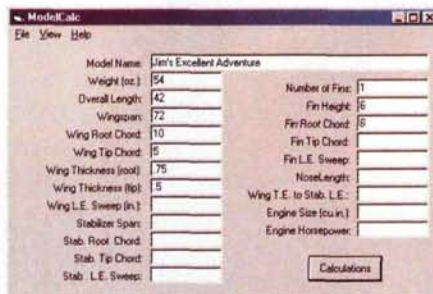
applies the hatch pattern inside but does not allow voids such as holes and slots, and it hatches over them. This makes it difficult to hatch

complex cross-sections. Hatching is also non-associative: if you move or resize the hatch boundary, the hatch pattern itself doesn't change accordingly.

A typical drawing is more than just lines, arcs and symbols, so ModelCAD provides a selection of tools for adding annotations such as text, dimensions, pointers and callouts. Like other CAD applications, ModelCAD calculates dimensions automatically by basing its measurements on your point selections, and it offers several options to control dimension type and appearance. Dimensions are not fully associative, so they are not tied to the geometry they measure. Move or stretch the geometry, and the dimensions remain unchanged unless you also select the dimension's endpoint to be included in the stretch operation. In that case, the dimension is updated automatically. The other annotation features in ModelCAD are good; they allow you to add single- and multi-line notes and callouts to your drawings, and you can also add text along an arc.

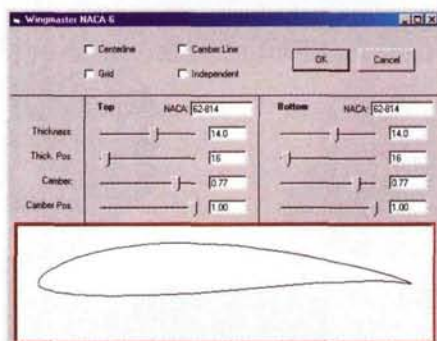
Although ModelCAD uses a proprietary file format, files are fully compatible with Upperspace's more expensive and more powerful product, DesignCAD. You can also export a drawing in AutoCAD's native DWG format or use open standard DXF, WMF and VRML formats. The program can import DWG, DXF, IGES, WMF, HPGL and XY formats, so it gives you quite a bit of flexibility to import drawings created with other applications. You can also import graphics from a scanner and from most bitmapped graphics formats such as JPG, PCX, BMP and others.

Left: ModelCAD provides an adequate set of 2D drawing tools and a limited number of model-specific symbols. Here is a sample 3-view created with ModelCAD. Below right: plug basic design information into ModelCalc as a starting point for calculations. Below left: ModelCalc calculates and analyzes a design according to the dimensions you input.



You can also save drawings or parts of them as bitmapped images.

When it's time to stop designing and start building, you'll find a good set of features for plotting and printing the drawing. Because it's a standard Windows application, ModelCAD can print to any printer or plotter supported by Windows. The program's ability to export to HPGL, a plot language developed by Hewlett-Packard and supported by most plotters, offers additional



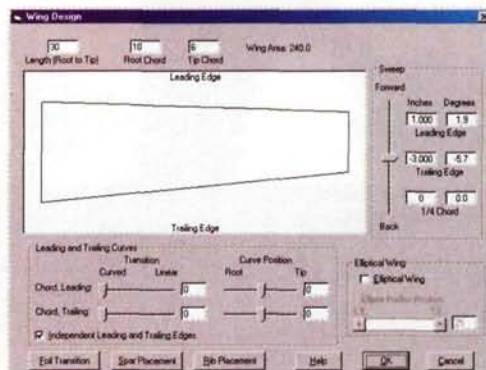
Above: WingMaster makes it easy to fine-tune an airfoil, and it offers several airfoils as starting points. Right: after you've selected the airfoil, use WingMaster's Wing Design dialog to specify wing parameters.

a little humor into it. When I plugged in some fictitious numbers, ModelCalc informed me that the wings would probably have a tendency to "rip off." That's good to know before you cut foam or balsa.

ModelCAD includes a small selection of aircraft airfoils as well as a selection of track, bridge and building components for model railroads. Although you can resize the airfoils and create your own manually, ModelCAD by itself does not include a wing designer. If you're serious about wing and aircraft design, consider Upperspace's WingMaster program; it is a great tool for modifying airfoils and designing wings. You specify parameters such as airfoil type and wing dimensions and then modify various properties to get the design you want. WingMaster can export the resulting 2D wing airfoil, plan and ribs to ModelCAD or to an HPGL file. WingMaster is a great tool for designing wings quickly and easily.

Although ModelCAD's drafting capabilities are adequate for most tasks, they don't compare well with some of the other inexpensive 2D design applications. IMSI's TurboCAD 2D 6.5, for example, offers an expanded selection of drawing and annotation tools, supports associative hatching and provides a somewhat better set of editing tools.

ModelCAD, WingMaster and ModelCalc



are very useful programs. I would, however, like to see Upperspace market the three as a package for the same price as they currently charge for ModelCAD alone.

If you'd like to design your own models, or you simply like to draw pictures of model planes, then ModelCAD is a good place to start. ✦

Upperspace Corp., 600 SE 49th, Pryor, OK 74361; (918) 825-6359; fax (918) 825-6359; www.designcad.com.

PRODUCT WATCH

Latest product releases

AT MODEL AIRPLANE NEWS, we not only tell you what's new, but we also try it out first so we can bring you mini-reviews of the stuff we like best. We're constantly being sent the latest support equipment that manufacturers have to offer. If we think a product is good—something special that will make your modeling experiences a little easier or just plain more fun—we'll let you know here. From retracts and hinges to glow starters and videotapes, look for it in "Product Watch."



BOB VIOLETT MODELS

Heat Shield Hot stuff

Excessive engine heat is a serious problem for many scale modelers. Scale-model engines tend to run very hot because they are concealed within the cowl. Heat also builds up when scale intakes happen to be placed on the "wrong" side of the cowl, as they often are. The problem can be even more troublesome in jet models because of the extensive heat produced by both the turbine and its exhaust.

Bob Violett Models offers an environmentally safe solution. Heat Shield is a water-based, ceramic material that is very easy to apply; simply brush it on. It is water-repellent and has excellent heat and fuel resistance.

I decided to use Heat Shield on my Zlin Z-526 (soon to be featured as a plan in *Model Airplane News*). I thought it would make a good test case because when building the model, I chose to install the silencer behind the engine. Though this kind of setup is practical, it makes it difficult for cool air to reach the silencer and even more difficult for hot air to exit the cowl. To prevent convective heat from damaging the surrounding structures, I installed an oversize silencer and applied Heat Shield to the inside of the engine cowl and the aft fuselage.

Before applying Heat Shield, you must stir it well. I applied three layers, and they gave my Zlin an even, opaque coating. Additional layers of fiberglass cloth and Heat Shield will produce a thicker coating and provide even greater protection.

The material dries fairly quickly, but you can use a hair dryer to speed up the drying process. Clean the brushes with some mild soap and water.

I tested Heat Shield's ability to reflect heat by exposing an 1/8-inch piece of ply that was covered with three layers of Heat Shield to several sources of heat. The results were truly amazing. The surfaces treated with Heat Shield reflected nearly all the heat, and there was only a slight rise in temperature on the opposite side of the ply.

A 1-pint (16-ounce) can of Heat Shield costs \$19.50. As with any ceramic material, Heat Shield is heavy! To keep your model's weight down, be sure to apply it only to those areas that will benefit.

—Dick Van Mourik

Bob Violett Models, 170 SR 419, Winter Springs, FL 32708; (407) 327-6333; fax (407) 327-5020; www.bvmjets.com.

ROBART MFG.

All In One Prop Wrench One size fits all

Every RC'er needs a good prop wrench in his or her field box. Actually, most need two: one for metric sizes and one for standard sizes. In almost every case, the wrenches fit only four sizes each and are fairly small, making it difficult to apply sufficient torque to properly tighten prop nuts. The new Robart All In One Prop Wrench solves all of these problems.

The Robart wrench is made of 1/16-inch flat steel. It is designed to fit 12 nut sizes: six metric sizes ranging from 8 to 14mm and six standard sizes ranging from 5/16 to 5/8 inch in 1/16-inch increments. The flat shape is convenient for storing in a field box, and the 8-inch length allows you to apply a lot more torque than small, cross-shaped wrenches.

This could be the only prop wrench you'll ever need. It's available at your local hobby shop at the bargain price of \$6.95.—Jim Onorato

Robart Mfg., P.O. Box 1247, 625 N. 12th St., St. Charles, IL 60174; (630) 584-7616; www.robart.com.



PRODUCT WATCH

HANGAR 9

Double Vision Fast Field Charger

Charge it!
Hangar 9's new peak-detection, fast charger can be powered by a 12V DC source (such as an auto battery) or by a 115V AC supply that is capable of delivering 12 volts DC at more than 5 amps. Its primary purpose is to fast-charge 4- to 8-cell Ni-Cd and NiMH packs.

The charging rate is fixed at approximately 800mAh. The Double Vision is capable of charging 4- or 5-cell receiver batteries with capacities of 270mAh to 2800mAh and 8-cell transmitter packs with capacities of 500 to 1800mAh. There is also a provision for charging a single-cell glow-plug igniter battery at roughly 500mAh current.

The input cable is almost 6 feet long and terminates in two alligator clips. Two output cables are provided with connectors already attached. The cable for the 18-inch receiver battery (4 or 5 cells) has a Futaba J-style male connector attached, and a 23-inch transmitter-pack charging cable terminates in a standard RC connector.

The polarity of the transmitter charger output can be reversed to accept JR or standard wiring. A main power on/off switch prevents sparks from flying when you connect the charger to its source battery.

A nice feature of the Double Vision is that the transmitter and receiver outputs each have a series of LEDs that will light when the battery is at 20, 40, 60, 80, or 100 percent. At full charge, all four red LEDs will glow steadily, and the green LED will flash. At that point, the charge level has peaked and it will cut off automatically, reverting to a trickle-charge of about 100mAh. Receiver and transmitter battery packs can be charged simultaneously.

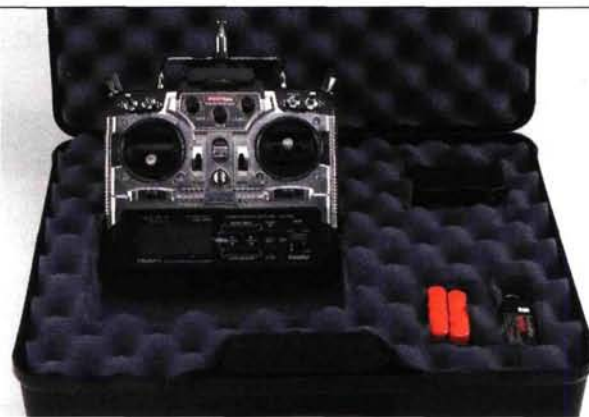
Most RC system batteries are not intended to be charged quickly. The 800mAh charge level of the Double Vision is a rather conservative choice that should minimize any battery problems. It's wise to monitor the battery temperature during charging. If a pack gets hot to the touch, it is time to quit.

With this fixed-charge rate, you must remember that a 270mAh battery might take only 20 minutes to reach full charge (if fully depleted at the start), while a 1600mAh pack might take as long as 2 hours.

As a precaution, use a timer to cut off the charger after 105 minutes of operation. A high-capacity battery pack might take longer than 105 minutes to reach full charge, so if the timer cuts out before reaching peak, you may have to start the charge a second time.

All in all, the Double Vision worked flawlessly. The instructions are more than adequate and, at \$56.95, the price is right.—*Bob Aberle*

Horizon Hobby Inc., 4105 Fieldstone Rd., Champaign, IL 61822; (217) 355-9511; www.horizonhobby.com.



HOBBICO Plastic Transmitter Case

Pistol-packin' protection for your radio

A good transmitter is one of a modeler's most valued pieces of equipment. A

radio is a substantial monetary

investment; but more than that, it has a particular "feel" that you grow

accustomed to—it's your connection to your model in the air. Knowing how modelers feel about their favorite radios, Hobbico has produced a durable, light and inexpensive carrying case to make sure your radio stays protected.

The case is made of injection-molded, luggage-grade polypropylene and has three egg-crate foam inserts to cushion the transmitter during transport. The center foam insert can be cut to fit virtually any transmitter and accessories, or it can be shaped to hold two smaller radios. The case measures 12x16x5½ inches and is held closed by two slide-catches with holes molded into them to allow locks to be fitted. The hinges are molded into the plastic case and feature metal pins for extra toughness.

This case is very similar to those sold for protecting firearms, and it works really well for radios. The foam is easy to cut—just trace the gear with a black marker and cut along the lines. Egg-crate material is readily available at hardware or home-improvement stores, so you can easily shape several sets of inserts to fit a variety of equipment. If the case gets dirty, just pop out the foam and wash the case with soap and water. The case shell is extremely rugged—I have no doubt it would pass the Samsonite gorilla test with flying colors! And at just \$19.99, you can't go wrong.—*Matt Boyd*

Hobbico, distributed by Great Planes Model Distributors Co., P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; fax (217) 398-0008; www.greatplanes.com. ✦



NAME THAT PLANE

Can you identify this aircraft?

Congratulations to Steve Manning of Pawtucket, RI, winner of the June 2001 contest. Steve correctly identified the mystery plane as the Curtiss C-46 Commando, which he remembers seeing at the Naval Air Museum in Pensacola, FL. The C-46 was an Army production model of the Curtiss CW-20, a commercial

transport plane that was redesigned to carry wartime supplies over the Himalayan Mountains during WW II. More than 75 percent of the U.S. Army Air Transport Command's India-China fleet was comprised of C-46s. The Commando had a 108-foot wingspan and was powered by two Pratt & Whitney R-2800-51s. ✦

The winner will be chosen, four weeks following publication, from correct answers received (delivered by U.S. mail) and will be awarded a free, one-year subscription to *Model Airplane News*. If already a subscriber, the winner will be given a free, one-year subscription extension.



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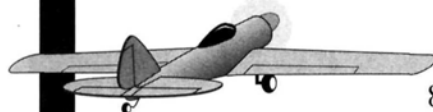
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The Floating Cube

My highly maneuverable RC slow-flight model lacks most conventional aircraft elements. Aerodynamic lift, stability, turning and flight control are accomplished without any formal wings, rudder, tail, ailerons, or control surfaces. I borrowed elements from kites and helicopters to produce a new design that is simple and rugged. Over several years, I have conducted hundreds of flights with a series of experimental prototypes. It's an unusual aircraft in that it lacks a streamlined appearance, but the Floating Cube is remarkably agile in flight. It ascends at a steep angle and can virtually turn on its own axis to rapidly reverse direction.

The RC aircraft consists of a lifting body comprised of a series of lightweight planar or thin airfoil surfaces arranged in symmetrical configuration (diagonal cube or rhomboid) around a central cavity. Suspended within the cavity are a motor and propeller that can be rotated by a servo to change the angle of the thrust vector. The aircraft

is essentially a diagonal box kite with a motor and a single prop suspended inside.

With four lifting surfaces surrounding the propeller, a very high surface area to weight is achieved, yet the

aircraft is very compact and crash resistant. Using only one propeller, with no blade pitch control and no control surfaces, controlled turning of the aircraft in a small radius at low speed can

be achieved without significant induced banking or loss of altitude. The thrust direction is regulated by rotating the motor/prop thrust angle within the cavity of the lifting body.

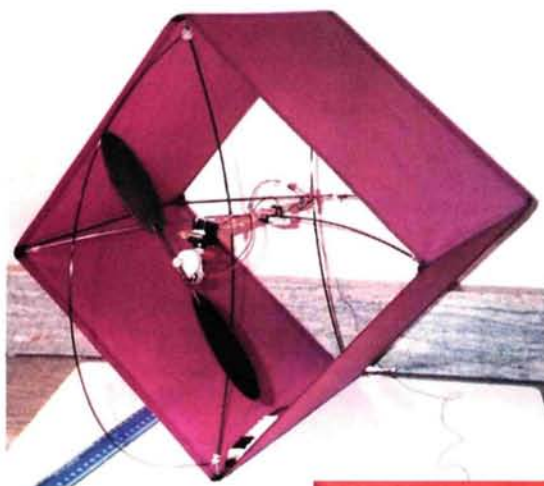
The angle of the rotation plane for the prop is at an upward pitch to the horizontal, providing an upward thrust vector and a balancing force. This maintains longitudinal stability because the center of gravity (CG) is forward of the aerodynamic center or neutral point of lift. The upward-angle thrust vector counterbalances the nose-down imbalance of the CG being forward of the aerodynamic center. Increasing the

power causes elevation of the flight path.

The model's compact size, light weight and resiliency are achieved by using internal tension and compression bracing and construction materials similar to those used for box kites. The lifting surfaces are all angled from the horizontal to achieve a large dihedral effect. Combined with a low CG (the battery is

mounted in the lower apex), a high degree of lateral stability is achieved—even in mild, gusty winds. This design also generates a flat thin or thin symmetrical airfoil necessary for a tailless aircraft.

I experimented with a wide variety of shapes, power units and construction materials. Compared to a cylindrical design, I found that angled surfaces held under tension (the diagonal cube) were superior in strength, lift and lateral stability, and they weighed the least. Carbon-fiber wing spars and a pine central-mounting rod provided a light, strong structure, and Icarus ripstop polyester cloth used in the kites made by Daniel Prentice's Shanti Kite Co. was an ideal covering. In fact, one of the cube-shape kites sold by Shanti could be adapted nicely into the RC aircraft design. I've taken my patent-pending aircraft design to Prentice to commercialize a series of model aircraft products that apply kite technology to the world of RC slow flight. ✦



SPECIFICATIONS

Model: Floating Cube

Type: RC lifting body

Corner-to-corner span: 16 in.

Ready-to-fly weight: 84g

Total surface area: 4 sq. ft. (576 sq. in.)

Wing loading: 0.75 oz./sq. ft.

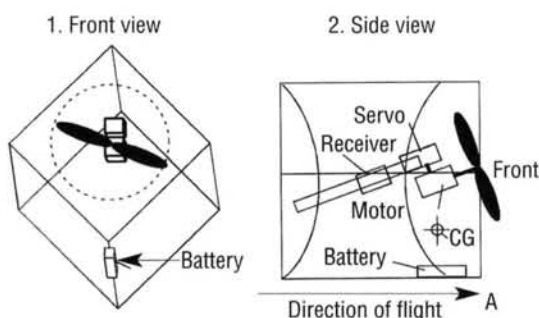
Motor: Sky Hooks & Rigging MNC-DC 524 coreless with 1:8.3 double-ball-bearing gear set and 2mm carbon-output shaft. The motor is mounted directly on the servo arm.

Prop: Braun carbon fiber

Battery: 8-cell, 50mAh

Speed control: JMP SCWES-2A Type 5

Radio: Sky Hooks RX72-PRO receiver, S-60 sub-microservo



Editor's note: a runner-up in the 4th Great RC Airplane Contest held by Model Airplane News, this unique model is the brainchild of Lance Liotta of Bethesda, MD. A video clip of the Floating Cube in flight is available at www.modelairplanenews.com. The Floating Cube will also be featured as the "Plan of the Month" in an upcoming issue of RC MicroFlight (www.rcmicroflight.com).

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